

# The Mining Journal

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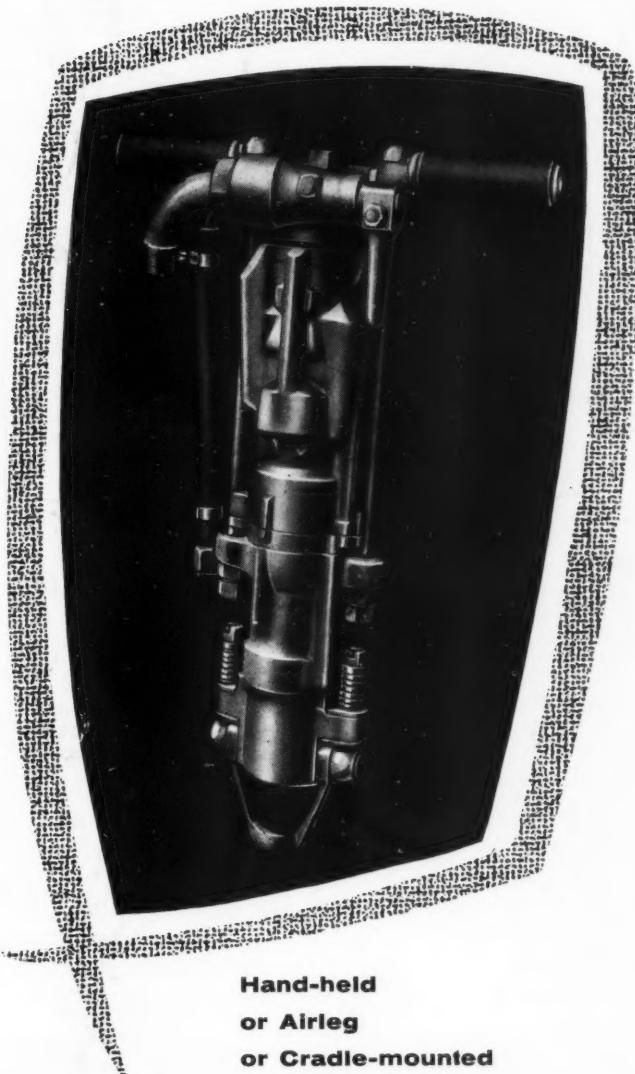
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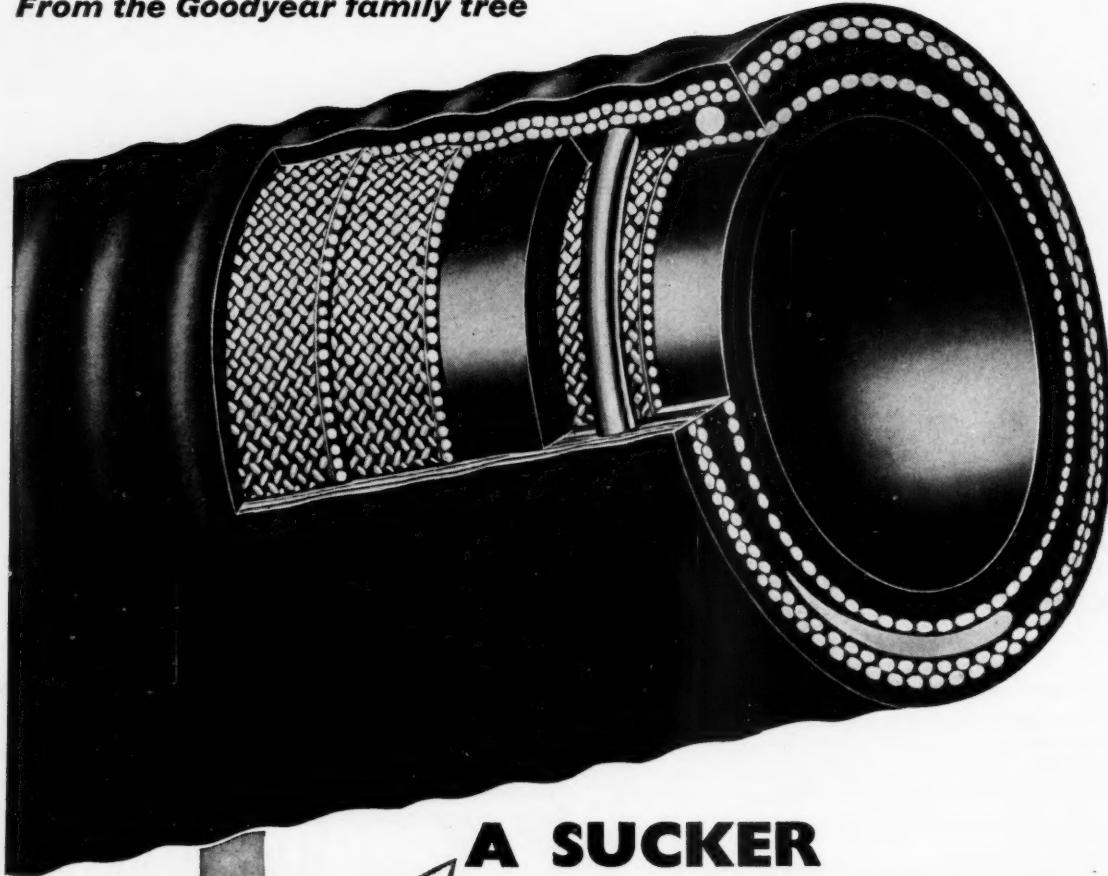
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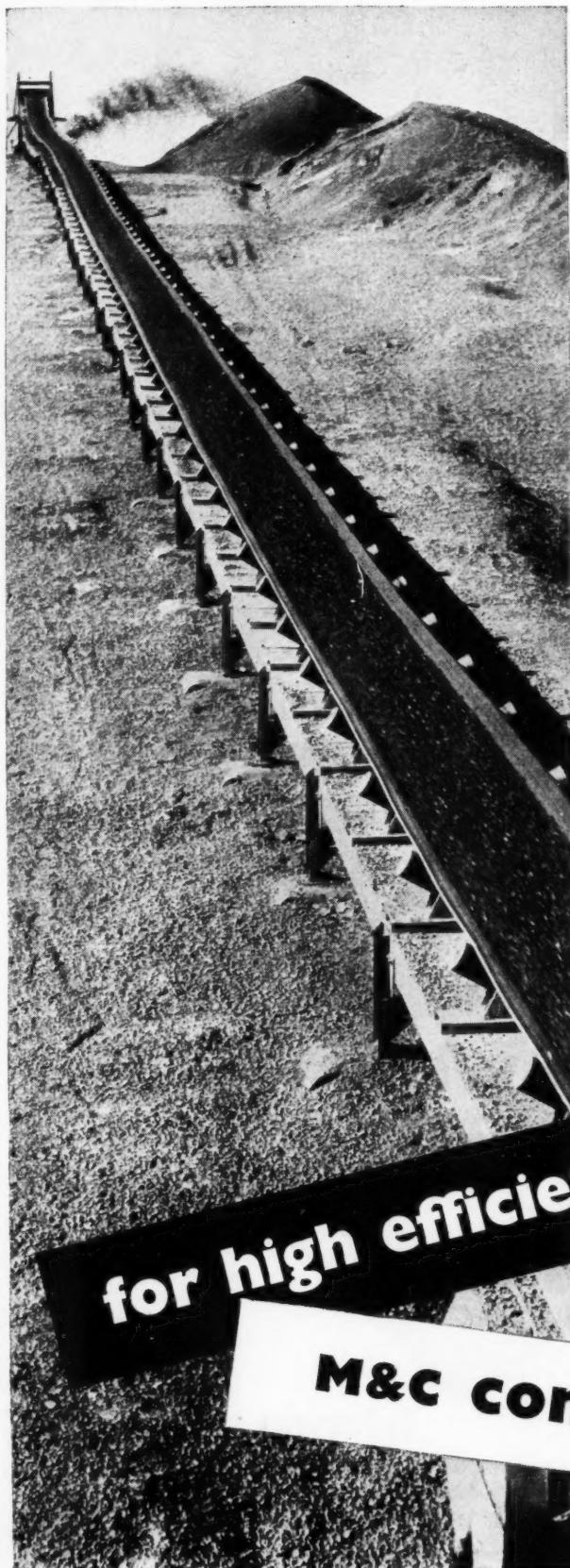

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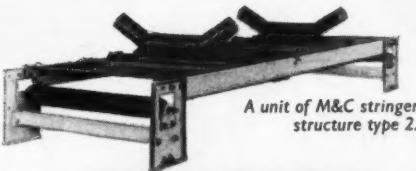
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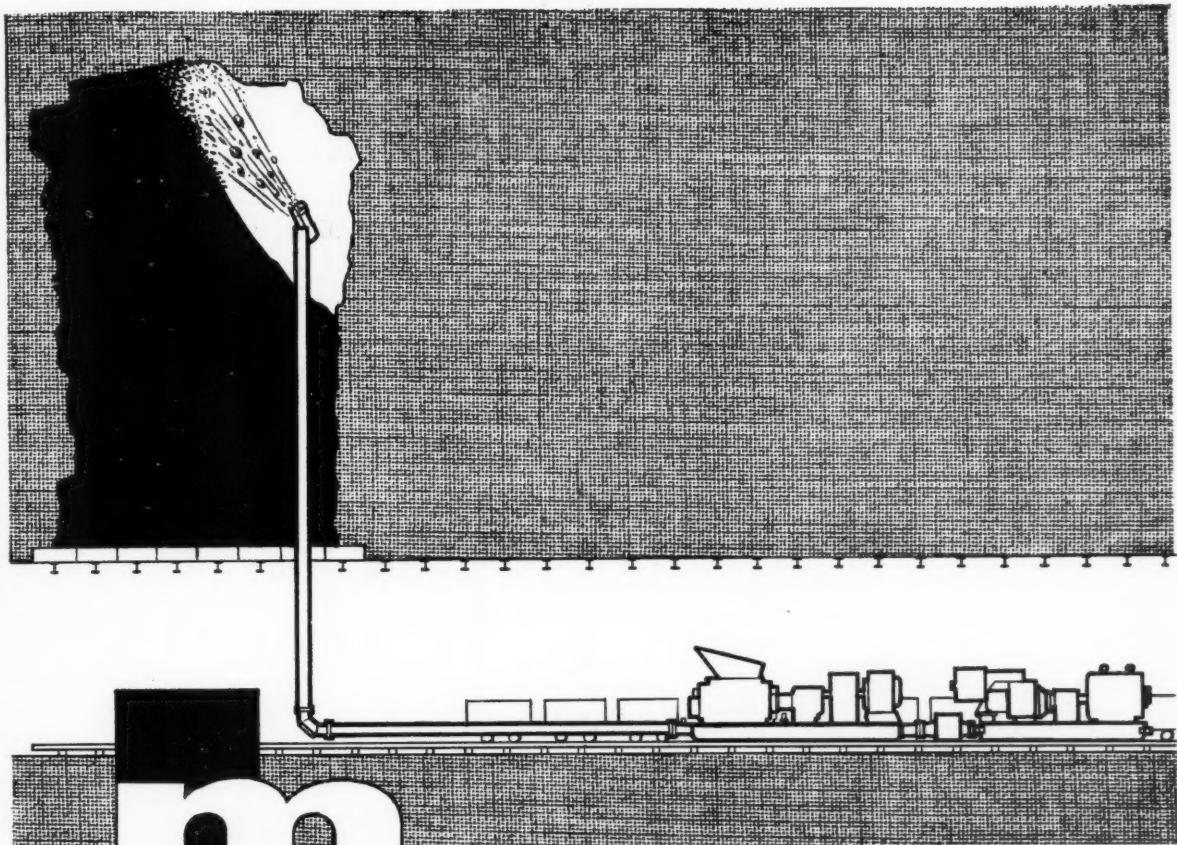
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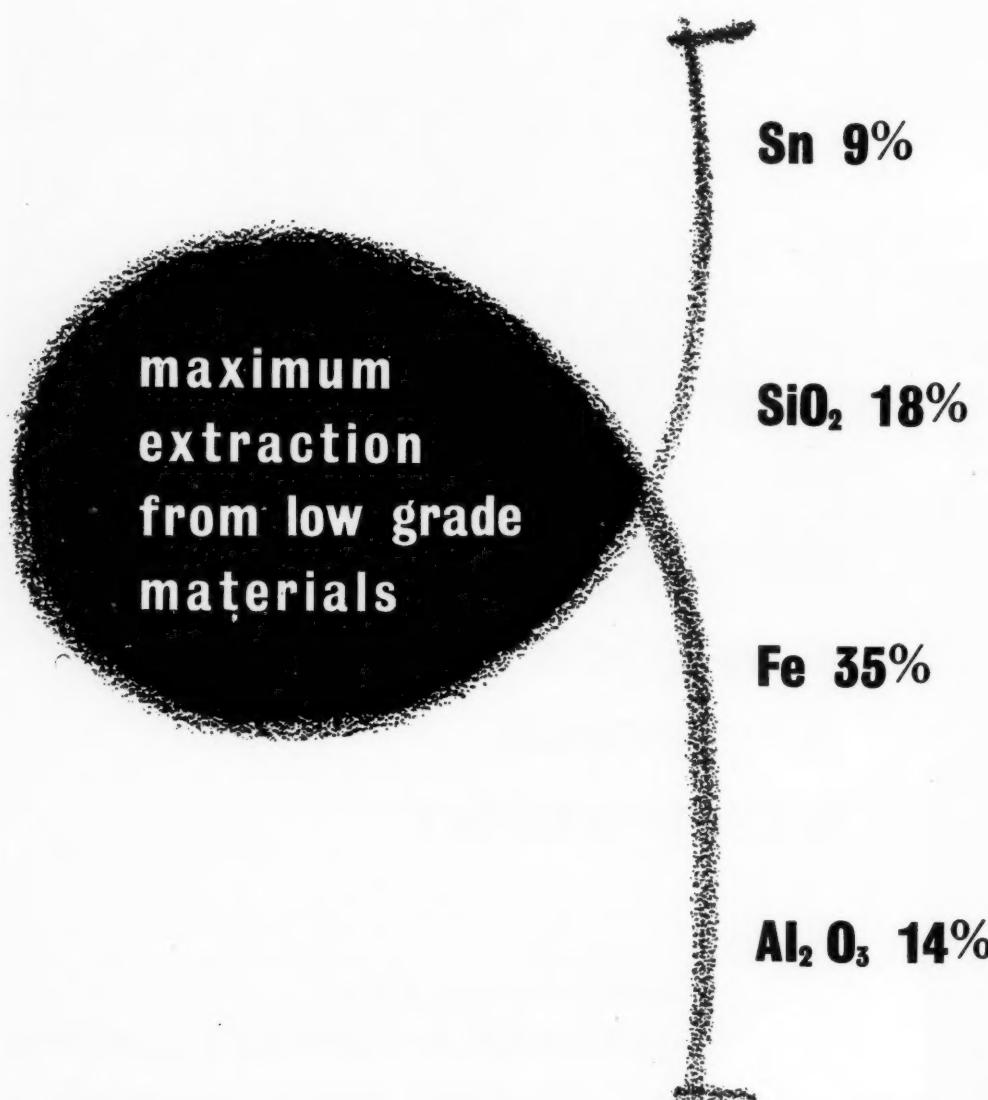
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London, April 1, 1960

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## On Having a Policy

**B**Y their very complexity, the problems of minerals economics and of the consequential policies of government and industry constitute an area of policy-making wherein there is seldom one obviously "right" solution, so that whatever the policy which eventually emerges, it represents at best a reconciliation of conflicting private and national interests and of existing policies in other related spheres of government. In all this, the notable difference between Britain and other industrialized countries is that seldom does the British Government appear to have a consistent, or even an identifiable, minerals policy or indeed to be aware of the need for having one.

Any reader who may be inclined to doubt this might usefully consider the objectives of the U.S. Bureau of Mines as described in our leading note of a week ago, and then try and visualize to what extent the machinery which gives effect to such purposes is to be found within our own government. If he still remains unconvinced, let him then look at what is being done by government in France, in Germany, and in Russia, not to mention several of the Commonwealth countries.

There is, of course, a considerable school of thought in Britain, both in government and industry, which sees no need for a government minerals policy and refuses to regard much of what is done abroad by agencies such as the U.S. Bureau of Mines as a legitimate field of government activity, or which alternatively argues that what is necessary in the government of a country, which is itself a major minerals producer, is not necessarily appropriate to Britain which (leaving coal aside) is almost entirely dependent on minerals imports. It nevertheless comes to us as something of a surprise to find Sir Ronald Prain, whom we have always regarded as someone with marked "planning" instincts, openly associating himself this week with these views — in part specifically and in part by inference.

His presidential address to the Institute of Metals (of which extended extracts appear on pages 378-380) encompasses the whole problem of the availability and economic inter-relationship of minerals. His analysis as usual is masterly and speaks for itself. His conclusions, on the other hand, strike us as, at least, debatable.

In the first place, he is clearly impressed, and rightly so, with the extent to which the countries of the world have become interdependent as to their minerals requirements in consequence of the erratic distribution of minerals in the earth's crust. He stands firmly by the Atlantic Charter in its recognition of this problem and in its desire to control it by peaceful methods, but he sees also that it has yet to find an effective solution to a situation which political events since the war have served only to aggravate. He argues strongly in favour of an open door policy in international minerals trading as the only means of ensuring the equitable redistribution of nature's unplanned depositions and points to Britain's own vital dependence on mineral imports.

He goes on, however, to put forward Britain's need for an open door policy as one of three reasons why he considers it unnecessary

that any machinery should be set up for keeping Commonwealth mineral resources under review. He adds as further reasons, first that he foresees no quick exhaustion of any particular mineral and believes that the free operation of the price mechanism will bring out whatever additional production is required, and secondly, that there are so many variables and imponderables in the world minerals supply/demand picture that conclusions reached, even by the best informed opinion, could, except in the short term, be little better than guesswork.

Coming from Sir Ronald Prain, these conclusions are unexpected, nor do we see that they necessarily follow from his earlier analysis. In the course of his address he quotes a recommendation to the British Government from the Institution of Mining and Metallurgy (following the latter's Symposium on Mineral Resources Policy in 1955) which favoured the formation of an advisory panel to give guidance to government on short and long-term policy regarding mineral development and use. He goes on to quote from a subsequent debate in the House of Lords in which Lord Bruce of Melbourne argued the case for a Commonwealth mineral resources policy with considerable force.

If, in the face of these arguments, Sir Ronald Prain remains unconvinced of the need for a Commonwealth mineral resources survey, he must accept—and it is our assumption that he does accept—the corollary that there is equally no need for a minerals resources policy, as the first is one of the necessary pre-requisites to the second. In this connection one senses that he fears that any conscious attempt to formulate such a policy may lead to the kind of economic nationalism in regard to minerals to which he is so rightly opposed.

Is it perhaps that the concept of a minerals resources policy connotes to Sir Ronald Prain something different from what was in Lord Bruce's mind? Sir Ronald says "I do not believe that it is realistic to draw a ringed fence round the countries of the British Commonwealth as if they were a trading unit entirely separate from the rest of the world". Lord Bruce, in his speech to the Lords in November 1955, suggested "that a competent group should be formed and should be given the task of examining what is the raw materials position in relation to the industrial requirement (a) of the world (b) of the sterling area and (c) of the British Empire; and having ascertained that to survey what are the Empire's resources and the possibilities of developing them".

There was surely nothing in Lord Bruce's proposal which implied any intention to turn the Commonwealth into a closed shop for minerals trading. On the other hand, there are the very strongest reasons for arguing that it is high time the British Government became politically conscious in the sphere of minerals economics. Even if its policy is in most cases to be one of inaction, it must at least be able to measure the consequences of this, as of any other policy.

Uninterrupted minerals availability is vital to British industry and its appetite, as in the rest of the world, is likely to grow rapidly. In an absolute sense, there is, as Sir Ronald Prain says, no danger of shortages in the foreseeable future, but there is always the risk of temporary dislocation of supply or of a failure accurately to predict short-term demand, either of which can lead to wide price fluctuations and possibly even to short-time working in British industry. The avoidance of sudden short-term dislocation is largely a matter of stockholding coupled with the maintenance of an adequate margin of excess productive capacity.

These are essentially problems for the producer and consumer to resolve between them, as indeed the Americans appear to have done with some success during the last year's strikes, and it is not our contention that they are matters in which government should interfere while all goes well. They cannot, however, help but be matters of government concern if, in consequence of their going ill, British industry is slowed down or the cost of our imports is steeply increased. The

economy of the country is too delicately poised for any British government to be able to face with equanimity the repeated convulsions in price and availability which were characteristic of the 1950's.

Sir Ronald Prain recognizes clearly enough the failure of the world to implement the precepts of the Atlantic Charter and that the minerals policies of other powerful countries are often entirely contrary to Britain's best domestic economic interest, but the fact remains that Britain has got to live with these policies and to do so her government has got to understand what the policies are and to have at its disposal the data with which to evaluate the probable consequence of each new tariff or subsidy or of each new pre-emption of world resources.

Again, Britain's dependence on imported minerals bears closely on the whole problem of aid to under-developed countries both inside the Commonwealth and beyond. The industrialized areas of the world are coming increasingly to rely for their growing minerals needs on the emergent states in the under-developed areas, who, in turn often depend primarily on mining in the early stages of their economic advancement. The political implications of this mutuality of interest are self-evident and, on these grounds alone, it is incredible that our government seemingly has no identifiable minerals policy.

We do not have to look far either abroad or at home to see the divergences of national interest which are constantly arising and on which consciously or unconsciously major policy decisions are in fact taken. Thus at the end of 1956 we find Lord Mancroft stating the government's minerals policy in the House of Lords in the following terms, "Our policy is perfectly clear. It is that we must have a maximum supply from the most economic source, whatever that source may be. . . . It would be foolish to base our non-ferrous metal policy. . . on any other principle than that of obtaining these metals from the places, whether at home or abroad, where they can be produced more cheaply and efficiently than anywhere else, even under our own ground."

Yet this policy has to be reconciled with Britain being a signatory to the Tin Agreement and with Britain's coal industry being threatened by imported oil and natural gas. In the first case the policy of buying in the cheapest market appears to have been discarded, in the other, not. Again Board of Trade metal stockpiles are still being run down where they might otherwise have been kept as a reserve against the next time British industry is embarrassed by a sudden shortage or price squeeze. By what yardsticks are these decisions taken? Who supplies the data?

Those in this country who see no need for a mineral resources policy will no doubt be strengthened in their view by Sir Ronald Prain's conclusion that there are so many rapidly changing factors in the mineral supply/demand situation that any survey would be of relatively slight value except in the immediate short term. From observations he makes earlier in his address he would however seem to be thinking in terms of a survey taken at a moment in time rather than of any continuing statistical process. The Paley Report was of course a survey taken at a moment in time, but it was a survey based to a very substantial degree on continuing records maintained by the U.S. Bureau of Mines and we have little doubt that if Washington ever thought it expedient to produce an up-to-date version of Paley, it could readily do so at fairly short notice from the continuing records at its disposal.

This whole problem of mineral resources cannot be tackled on any *ad hoc* or "one time only" basis. If the government is to have a policy, it must have available the statistics and other data upon which to formulate that policy, and if these are to be of any use they must be continuously maintained. The projections thrown up by such statistics obviously become liable to increasingly wide margins of error as they move into the future and they must therefore be under continual revision and refinement, only possible if the intelligence services upon which they are based are continuous.

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No policy can purport to be based on anything more than the best information and experience available at the time when it is drawn up, and it is the essence of good planning that there should be sufficient flexibility in policy making and execution to accommodate planning changes necessitated by changing circumstances. The great danger is that without the necessary intelligence services, the awareness of changing circumstances may not even exist.

## MINING PROGRESS IN ONTARIO

The Ontario Department of Mines reports that the number of claims staked during 1959 in the Porcupine Mining Division and in the adjacent divisions of Sudbury and Larder Lake increased considerably over those staked in 1958.

Several of the producing mines in the Porcupine and Matheson areas are deepening their underground workings. Hallnor Mines Limited is deepening a winze by 325 ft. McIntyre Porcupine Mines Limited is preparing to sink a large internal shaft deepening its mine by 1,000 ft. to permit deep mining and investigation of the recently acquired Central Porcupine claims.

Two mining companies are carrying on underground development for exploration purposes. Fatima Mining Co. Ltd. has sunk a shaft to 790 ft., with crosscuts on the 450-ft. and 740-ft. levels to investigate a nickel prospect in the townships of Bartlett and Geikie. Thorncliffe Mines Ltd. has sunk a shaft to 100 ft. to investigate a gold prospect in Garrison township.

Violamac Mines Ltd. has stated its intention to bring the Kam Kotia copper property into production by August of this year. Two established mines, McIntyre Porcupine Mines Ltd. and Paymaster Consolidated Mines Ltd. have reported the discovery of copper mineralization in Tisdale.

A number of prospects in the area have been diamond drilled in the last year or are currently being drilled. Kukatash Mining Corporation drilled a record 57,000 ft. in the Kukatash area to outline an iron formation of interest. Canadian Johns-Manville Ontario Ltd. is continuing a drilling programme on asbestos bearing peridotite in the Kenogamiing township area. Maple Bay Copper Mines drilled a copper prospect in Godfrey township, and Lake Expanse Gold Mines Ltd. drilled six holes to investigate magnetic and electromagnetic anomalies in Jessop township. Montclerc Mines Ltd. is currently drilling their property in Clergue township in an attempt to define gold ore shoots in a mineralized zone outlined twenty years ago. Hedman Mines Ltd. is drilling in Warden township on an asbestos prospect.

Many companies are carrying on regional exploration.

A detailed report of mining operations in 1959 is given in a report recently published by the Ontario Department of Mines under the title "Ontario—An Expanding Empire in 1959".

## DIAMONDS FOR DRILLING PROJECT

The Mohole Project, an attempt by a group of American scientists to drill through the Mohorovicic discontinuity which bounds the interior of the earth, has been moved a further step towards realization by an offer from the African diamond industry. Industrial Distributors (1946) Ltd., a South African company which markets the industrial diamond output from the African mines, has offered to provide the diamond drill stones required for the exploratory phase of the drilling. This information was released last week by Mr. W. Bascomb, technical director of the AMSOC committee of the National Academy of Sciences.

In a speech before the New York chapter of the American Society of Mechanical Engineers, Mr. Bascomb said the Mohole Project has received generous offers of support from many areas of United States' business. The South African company is the first foreign firm to offer assistance. The exact amount of diamonds required for the exploratory phase of the drilling project has not been determined. Estimates have run as high as 50,000 ct.

Christensen Diamond Products Co., Salt Lake City, has offered to co-operate by producing drill bits with the diamonds supplied from South Africa. A new type of diamond drill stone, designated Drill 6, will be tested in some of the drill bits.

The purpose of the Mohole Project is to obtain continuous samples or cores of the rock layers beneath the deep ocean for scientific purposes. The plan is to drill a series of holes from a ship. These will culminate in a hole which penetrates the Moho and samples the material of the mantle. The exploration operation will test techniques for holding a ship in position and for drilling in deep water. The first holes will be shallow ones but they will be beneath 12,000 ft. of sea. Engineering studies are well advanced and the AMSOC committee hopes to complete the tests within the next year.

The information thus obtained can then be used to design a deep-drilling ship, capable of reaching to the Moho, which is at least 30,000 ft. below the sea surface. Under land it is at least three times that deep. Since the deepest hole yet drilled on land is 25,340 ft., it is clear that with the present state of technology the hole must be drilled beneath the ocean.

## ARE WE TO MISS ANOTHER CHANCE IN INDIA?

India, in common with many other under-developed countries is making strenuous efforts to boost mineral output, particularly coal, but, according to the chairman of the Indian Mining Association, substantial imports of mining machinery will be needed if future targets are to be hit. The I.M.A. has expressed alarm at the recent drastic reduction in mining machinery import permits. Shortage of foreign currency is severely hampering India's development programme, but it appears illogical to economize in such a basic industry and the Indian Mining Association has, with justification, appealed to the government to give fullest priority to the coal industry's need for mining equipment. Not only is concern felt about the slowing down in the rate of importation of new machinery but also because of shortage of spares for machinery already at the mines. Already some of this is lying idle due to lack of component replacements, representing a considerable non-productive capital investment.

If, in fact, India is to boost annual coal output from the existing 47,000,000 tons to some 90,000,000 tons, it is essential that top priority be given to the industry's machinery needs. Already the coal industry has the doubtful distinction of having the lowest output per manshift of any major producer, and an ample mis-applied labour force cannot be considered as a satisfactory alternative to highly productive machinery. At the present time many of the private mining companies are claiming that current mining costs are much too high and that a *pro rata* increase in output without commensurate increase in productivity is not feasible.

The problem facing the industry appears to be very clearly defined: either it mechanizes or it stagnates. If long-term credits are not available—and surely even the British Government must realize that this is a propitious moment for co-operation between the Indian Government and the Western manufacturers—India must put basic needs first. Undoubtedly nothing is more basically necessary than a thriving coal industry.

# Prain on Mineral Resources

**L**EAVE us start by looking back to the position of about 50 years ago, when this Institute was founded, and let us compare certain aspects of that picture with the situation today. I start by selecting three sections of this picture: first, the scale of the mining industry; secondly, the changes which have occurred in the proportionate uses of metal; and, thirdly, the shifts which have occurred in the geographical distribution of sources.

Taking the first of these, the annual world primary consumption of seven selected metals, namely, copper, lead, zinc, tin, aluminium, nickel, and magnesium, amounted, some 50 years ago, to about 2,700,000 tons. In 1958, the last year for which figures are available, the consumption of the same seven metals amounted to about 13,000,000 tons. This spectacular increase in the consumption of metals is due to the continual effect of the counterplay between, on the one hand, a demand based on an increasing population, multiplied by a higher standard of living, and, on the other, the mechanical revolution which has enabled these greatly increased tonnages to be produced with a resultant lowering of cost.

Even more spectacular, however, is the increase in the tonnage of ores mined to yield these metals. It is not possible to discover with any exactitude the tonnages mined then and now, but it is possible to apply an empirical factor, for instance for copper, based on the lowering of grade and other relevant factors, which indicates that, while the consumption of these seven metals has increased some five times, the scale of mining operations has increased perhaps thirty to fifty times.

## Shift to Mass Mining

Apart from the effects of mechanization which, after all, are common to most industries, the mining industry during this period has experienced a development peculiar to itself, namely the shift from selective to mass mining. Prior to this period mining, though greatly advanced in its techniques and tools since the beginning of the 19th century, was still based fundamentally upon the working of rich vein deposits. It was the realization by the mining industry that mining, if it was to take its share of the industrial development of the 20th century, had to find methods of producing metals as business enterprises and not speculations, that led to the development of the so-called mass mining.

These developments in the field of mass mining have not only vastly increased the supplies of metals and the assurance of future supplies, but have, as already indicated, also had the effect of reducing the cost, a factor to which I shall again refer later.

Let us turn next to a study of the changes which have occurred in the proportionate uses of the seven metals I have selected. In the decade during which this Institute was founded, copper accounted for 28 per cent of the combined consumption of these seven metals in the whole world, including Russia; lead 40 per cent, zinc 27 per cent, tin 4 per cent, aluminium and nickel each under 1 per cent, and magnesium nil. For the latest year available, 1958, the consumption of aluminium has climbed to no less than 27 per cent. It is interesting that the proportion of copper usage is virtually unchanged at 28 per cent. The advance of aluminium within this group of seven metals is seen to be matched by a decline in the position of lead, which you will recollect 50 years ago was 40 per cent and in 1958 was 19 per cent, and of zinc, which was reduced from 27 per cent to 22 per cent. Tin also was reduced from 4 per cent to a figure rather over 1 per cent

Sir Ronald Prain gave his Presidential Address to the Institute of Metals at its Spring Meeting in London on Tuesday of this week. His subject was "Mineral Resources and Metal Reserves". We publish here extended extracts from his address, certain aspects of which are discussed in our leading note on page 375. Sir Ronald is chairman and president of the Rhodesian Selection Trust Group of Companies

while nickel and magnesium both made advances, nickel from under 1 per cent to 2 per cent and magnesium from zero to 1 per cent.

If we compare 1958 with the first decade of this century, the following main geographical differences are noticeable (the percentages refer to metal content of ore mined). The share of Russia and Siberia has grown from under 1 per cent in 1901-10 to 12 per cent in 1958; Africa's share from 2 to 11 per cent; Asia's from 5 to 6 per cent and America's, other than the U.S.A., from 12 to 34 per cent. The United States' share fell from 40 to 14 per cent, Oceania's from 13 to 5 per cent, and non-Russian Europe's from 27 to 18 per cent. I shall refer later to some of the implications of these changes.

## Price-Cost Relationships

I now turn to the vital and critical question of the effect of price on ore reserves and the effect of cost on supplies. It is obvious that every raw material lying in the ground will require some effort to mine it and a further effort to extract the metal from the ores, and that this effort cannot under our Western economy, or for that matter any other, be made without cost. That cost will vary not only from metal to metal but from mineral to mineral and from location to location.

We are confronted with the fact that what is ore in one location is not ore in another, though to the scientist the deposits may be identical. Here then we see the effect of economics on the assessment of ore reserves; that is, that what we call ore reserves are, under the capitalist economic system, to be distinguished from what, under scientific definition, we call mineral resources. The former must necessarily be but a fraction of the latter. Let us, however, proceed to analyse further the nature of the ore reserve problem.

Since both costs and prices fluctuate seasonally, cyclically, and secularly, as well as fortuitously and perhaps rapidly, it follows that the definition of an ore reserve is a most elusive concept. If costs remain constant, a mining concern will have more ore as the price of its product goes up. When prices are constant, a mining concern can write up its ore reserves if a technical innovation or some other development reduces costs; conversely, if costs increase the ore reserves may have to be written down.

A recent study had as its object the unveiling of some of the basic reasons for the economic behaviour of metals; it covered for the five-year period 1953-57 the relationship between the price of each of 32 metals (in terms of metal content), the Free-World metal production, and the supposed abundance of the various metallic elements in the lithosphere. Another factor examined was that of by-products.

The first interesting relationship is the strong negative correlation between price and metal production; the higher the production, the lower the price, and vice versa. Secondly,

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we have a strong positive correlation between the abundance of a metallic element in the earth's crust and the annual Free-World production of that metal.

The essential link in the relationships between abundance, metal production, and price appears to be grade of ore; mining and milling costs are largely related not to metal content but to tonnage of ore. Later processing costs relate more to metal content. An abundant metal is more likely to be available in quantity in high-grade ores than a less abundant one. For example, iron is more abundant than copper, and the average grade is higher. So, although the total Free-World tonnage of ore produced annually is of the same order, about 400,000,000 tons each for iron and copper, less copper metal is produced. Processing cost is another factor, for high processing cost will decrease tonnage and increase price, relative to abundance. History shows that uses will sooner or later be found for metals available in quantity.

Thirdly, we have the factor of by-production. Ten of the 32 metals are mainly produced as by-products from mining or industrial processes; eight of the ten are in the lower half of the abundance table and all, except one, are in the lower half in order of metal production. The correlations between abundance, production, and price are less marked than for ordinary metals. Moreover, the general level of production in relation to abundance is lower, whilst the price realized for a by-product is only a fraction of that of a non-by-product of equivalent tonnage. The reason is clear, that by-products do not generally have to bear their full share of mining and milling costs.

Industrial power has become to a large extent a measure of modern political and military power. Since industrialization is based largely on mineral resources, the control of essential mineral supplies inevitably has become a subject of international rivalry and controversy. I refer again to copper, lead, zinc, tin, aluminium, nickel, and magnesium. If we classify these metals by the political control of the countries in which they are mined, and not merely by geographical location, we find that the Soviet-controlled countries, which did not exist as such in the first decade of this century, accounted for 18 per cent of these metals by 1958. The share of North America and countries under U.S.A. political control fell from 44 to 22 per cent; that of Europe and its dependencies from 38 to 20 per cent. On the other hand, the share of countries independent of political control by European, North American, or Soviet countries rose from 18 to 26 per cent in 1958, to which we may add another 14 per cent which were wholly or partially under European political control in 1958 but are now already independent or likely to become so in the sixties. The main factors in the increase in the share of independent countries are, first, that many more countries are now independent and, second, that metals are now mined in greater quantity outside Europe and North America.

#### Minerals Interdependence

Nations have thus become physically interdependent as to minerals in a way that presents a problem which becomes increasingly acute as world industry expands. Nations have tried to meet it in various ways. One obvious way, of which we have memories within our lifetime, is that of physical aggression with a view to conquest of whole territories. As a result of the last war, the United States and this country devised the Atlantic Charter, which sought to recognize this problem and to control it by peaceful methods. I may remind you that in the Atlantic Charter the two countries:

"...will endeavour, with due respect for their existing obligations, to further the enjoyment by all states, great or small, victor or vanquished, of access on equal terms to the trade and to the raw materials of the world which are needed for their economic prosperity."

The general acceptance of the principles of this Charter by the United Nations has served to make access to raw materials on equal terms a central feature in the post-war reconstruction programme. However, the economic and/or political control exercised by a few nations over the mineral sinews of industrial strength is one of the great challenges of our age, which, although recognized in lofty phrases by the Atlantic Charter, has not been met in a manner which is satisfactory to all nations. Political developments of recent years have, in fact, aggravated this challenge.

#### The Open Door

Even if the efforts of the United Nations have succeeded in preventing further wars arising from this maldistribution of mineral resources, nothing has prevented the peaceful struggle for economic control which is permissible under the rules of the capitalist Western world. This economic competition has taken the form of the acquisition of commercial control over minerals in foreign countries. Considerable prominence has been given in this country in recent years to efforts which have been made by other countries to acquire control of mineral assets situated within the British Commonwealth. Such efforts have met with considerable emotional resistance in this country, and yet I believe that an impartial assessment of the factors involved would show that in any attempt to preclude the acquisition of British mineral assets by foreign nationals this country would be the loser. For this country has more to gain from a policy of the open door than it has to lose. This country is, so far as is at present known, singularly deficient in mineral resources, excluding coal, and as it has of necessity to support one of the most highly industrialized societies in the world, it must depend for its existence on its freedom and ability to acquire mineral resources outside of these islands, not only within the Commonwealth, but elsewhere. Over the years, for this reason, there has grown up the British overseas mining industry, an industry whose ramifications are so vast and so complex as to baffle any attempt to reduce them to meaningful statistics.

In my opinion any attempt by the British Commonwealth of Nations to preclude foreign nationals from acquiring economic control over material resources within the Commonwealth would result in this country finding itself the victim of similar restrictive measures applied in foreign countries.

I am not unduly concerned about the strategic consequences of an open-door policy. A foreign national investing in a mining enterprise in the British Commonwealth does so in the full knowledge that in the event of war his nationality will have to be subjugated to any laws imposed in such country whereby the products of that country may be directed to destinations over which the mining company may have no control. The foreigner takes a calculated risk, but the last word rests with the country wherein the mining operation occurs. The same applies of course to British companies operating in foreign countries.

We have not yet touched on many of the artificial manifestations of the modern Western economic scene which bear on this subject, such as the control of the exchange of currencies; the imposition of tariffs for the protection of a national industry; the setting of quotas either in a private or public capacity for the purpose of the orderly control of production; the existence of cartels and monopolies, and the determined efforts made to prevent or disturb such monopolistic arrangements; the actual or attempted acts of nationalization; the imposition of import and export controls; the enormous programmes of government stockpiling. Each of these would suffice for an essay of its own to describe the effect of these economic measures on the assessment of mineral reserves and resources, but I have I think said enough to demonstrate that we are dealing here with a subject which science plays but one part. We find ourselves in a world governed not so much by what I earlier called the

disciplines of scientific enquiry, but by the conflicting and often irreconcilable factors of economics and politics.

In the United States an attempt was made some years ago to carry out an enquiry as to United States resources through a special committee set up by the President, known officially as the President's Materials Policy Commission, or more popularly as the Paley Commission. It has been suggested on more than one occasion that the British Commonwealth should undertake the equivalent of a Paley Report.

The Institution of Mining and Metallurgy in September 1955 held a symposium on Mineral Resources Policy, at the request of the Department of Scientific and Industrial Research. Following on that symposium, the Council of the Institution informed the Department that the consensus of opinion expressed by the contributors

" . . . appeared to be in favour of the formation of an Advisory Panel that would give guidance to the Government on short-term and long-term policy regarding mineral development and use."

They added that they were of the opinion

" . . . that the first steps should be for the Government to establish a small Committee to consider these conclusions and to ascertain the views of Industry and of others concerned."

#### Plea for Minerals Survey —

In November 1955 Viscount Bruce of Melbourne, speaking in the House of Lords, said:

" I would make specific suggestion. The first thing to be done is to ascertain the exact facts. My suggestion is that a competent group should be formed—and there should be no difficulty in obtaining suitable personnel—and should be given the task of examining what is the raw materials position in relation to the industrial requirements (a) of the world, (b) of the sterling area, and (c) of the British Empire; and having ascertained that, to survey what are the Empire's resources and the possibilities of developing them."

Lord Bruce thought that the task ought not to be an impossible one, nor that it should take too long, and he thought it was lamentable that a real survey of this character had not already been made.

The Secretary of State for Commonwealth Relations, in the same debate, assured Lord Bruce that he would give most careful consideration to the proposal that the mineral supplies of the Commonwealth should be examined, and that some machinery should be found for examining the raw material resources of the Commonwealth in relation to world demand. So far as I know, no such examination has, in fact, been undertaken or, if undertaken, has been made public.

#### — Is Rejected

This brings me to the point where I must give you my own views on the question as to whether a body should be set up to undertake a review of this kind. In my considered opinion there is no necessity at present to undertake such a review. My reasons for this conclusion flow from what I have already said and are as follows:

First, I do not believe that it is realistic to draw a ring fence round the countries of the British Commonwealth as if they were a trading unit entirely separate from the rest of the world. I have argued already in this address in favour of an open-door policy in international trade where minerals are concerned, and that any departure from this principle might find this country the real loser. To the extent that the Commonwealth may be deficient in some minerals (and we have already noted the essential maldistribution of minerals in the world), no review of existing knowledge, however thorough, is likely to rectify this position. The real protection arises from the

ability to acquire deficient materials from countries where they are in surplus.

Secondly, taking the world as a whole, I do not believe that we are about to witness the quick exhaustion of any particular mineral. History shows that if, in fact, such an extinction became a real threat, it only requires a change in the price/cost relationship to encourage the discovery of as yet unknown reserves. The limitation of any survey of the raw material position is that it must necessarily deal with the known position at a given time, in other words with a static picture, whereas I have tried to demonstrate that we are concerned with a moving picture and one that will constantly change under the impetus of demand and the price/cost relationship which is the governing discipline in our capitalist world.

Thirdly, and as an extension of what I have just said, there are so many elements in that moving picture which have to be taken into account and which all themselves constantly fluctuate, that the conclusions of even the best-informed and most talented body which could be found to undertake the survey could only, so far as they would concern the medium and long-term future, be matters of judgment, instinct, and even speculation.

This may at first sight seem to you a negative conclusion. For two reasons, however, I do not believe that this is so. First, any serious attempt to produce what I may call a Commonwealth Paley Report would involve the creation of a very strong team of experts in many fields, each at the top of his respective profession. It might involve the creation of a large organization, and it would consume a great deal of the time and productive effort of many of our best brains. As I believe that the outcome of any such review could have only a limited and relatively short-term value I think it a positive, rather than a negative step, to counsel against a creation of any such body.

#### What if Open Door Becomes Impracticable ?

Secondly, this conclusion, I submit, further underlines the importance of the open-door policy in international trade, to ensure the free access by any nation to any corner of the earth as envisaged in the Atlantic Charter. I would, however, qualify my remarks by saying that if political or economic events in the world should make it impossible to pursue the open-door policy, with the result that the British Commonwealth might in fact become an insulated trading unit, then it might be necessary to make an assessment of the raw material position within the Commonwealth area. If this had to occur, it would require, as Lord Bruce indicated, a special commission composed of men of widely differing experiences. I cannot think of any existing organization, whether it be one of the learned societies, the trade associations, or the government departments, which would in itself be equipped to make this study without any outside assistance. This Institute would have an important part to play in such an enquiry, since it is, after all, a society of metallurgists, and metallurgy is one important facet of an ever-changing picture.

I have tried to show that whereas the extent of ore reserves is at any one time governed by the price/cost relationship, the mineral reserves of the earth, and possibly the sea, are an entirely different matter, requiring only the correct price/cost relationship, the skill of the geologists in discovery, and of the mining and extraction engineers to liberate them. I have tried to argue that, under the initial impetus of price incentive, industries may so develop on to a sufficient tonnage basis as radically to alter the cost pattern. The metallurgist, through his influence on consumer taste or technical requirement or improved extraction methods, may well move the unmined metals from the category of mineral resources to that of ore reserves. If follows too that the work of the metallurgists in this country could in certain circumstances be frustrated if the world reverted to a policy of economic nationalism.

## CHEMICAL CONTROL OF WATER SEEPAGE IN MINE SHAFTS

**A**POLYMERIC water gel first used to reduce water intrusion in air drilled oil wells has been successfully used in America to control water seepage in a butane storage cavern and salt mine shafts and is expected to prove useful in general mining operations.

Marketed by Halliburton Oil Well Cementing Co. under the name of Hydro-Lok PWG, this gel works by penetrating the capillaries of a water-bearing formation. Its initial viscosity is almost as low as that of water, which aids its entry into a formation.

The new application for the water-sealing agent stems from a problem encountered by Sun Oil Co. during the excavation of America's first butane storage cavern in granite at its Marcus Hook refinery. The man-made cavern, built to hold 250,000 bbl. of butane upon completion, was producing a small amount of water from two fault zones and seepage from many small fissures.

Conventional grouting materials and methods did not halt the troublesome flows; cement slurry could not be forced into the relatively tight cracks and crevices in the gneiss-type rock.

The problem was referred to Sun Oil's Dallas research laboratory, who suggested that the Halliburton water control materials—one of which is polymeric water gel—might be the answer.

A Halliburton field service crew from the company's Indiana, and Charleston locations—plus a chemical engineer from Duncan headquarters—went to Marcus Hook for the experimental treatments. After a few applications the idea was proved to be practical and the company approved the completion of the project.

### Operational Method

The gel and a special resin cement were used for the treatments. The cement was employed as a bulking agent when spaces were large enough to require filling prior to sealing. The two materials were mixed in batches within the cavern, 306 ft. below the surface. Holes 6 to 32 ft. deep were drilled to intersect the water-bearing fissures. Packers were then set in the holes, and the water control agents were squeezed in and held under pressure. Injection pressures ranged from 400 to 1,200 p.s.i. Setting time of the gel was adjusted to vary from 8 minutes to 1 hour.

After 33 working days, more than 95 per cent of the water seepage had been stopped. This reduced the intrusion to a measured rate of less than  $\frac{1}{2}$  g.p.m. Some 600 treatments were made, varying from 3 to 800 gal. each. A total of 7,946 gal. of gel and 736 gal. of resin cement were consumed.

Incidentally, an interesting method was used for sinking the shaft for this cavity. Because the granite proved too hard and abrasive for the customary shaft drilling bit, a 50-in. diameter calyx drill was used to core the shaft, the 48-in. cores pulled from the shaft in lengths of up to 15 ft. weighing one ton per lineal foot. With the shaft at the desired depth, 42 in. casing was cemented in place. Two additional 17-in. holes were cored and cased with 12-in. pipe for ventilation purposes. These are now available for product removal.



Part of the underground excavation for the oil storage cavern at Marcus Hook, where a polymeric water gel was used to control water seepage

Excavation was a piecemeal job at the beginning until room was made for use of large-size power equipment. A ring of holes was drilled and blasted in the wall of the shaft at the desired elevation. With the space then available, air-operated loading machines were lowered into the cavern. Later, diesel-powered, front-end loaders were disassembled, lowered through the 42-in. shaft and then reassembled on the floor of the cavern.

The 25-man crew working from the bottom of the shaft began widening the cavern by dynamite-blasting. The bull-dozer cleaned out the rubble and pushed it to the shaft area, where it was loaded into buckets and hauled to the surface through a pipe in the shaft. The excavated granite was used at several refinery sites for surfacing, dock causeway building, etc. The walls of the cavern are not smoothed but remain rough and sheer.

The cavern was mined to a height of 37 ft. in rooms 35 ft. wide. Pillars 40 ft. in diameter were left on 75 ft. centres. Sumps, 6 ft. in diameter and 22 ft. deep, were sunk beneath each of the 12-in. ventilation holes and the casing extended to within 5 ft. of the bottom of the sump. Two deep well pumps in these holes are now used to remove butane. If these have to be inspected or repaired, water is simply pumped down the annulus between the casing and the pump column to equal the vapour pressure of the butane. This water seal then permits removal of the pump without loss of butane.

The successful use of the gel at the butane storage cavern was preceded by an application more nearly resembling oil field drilling. Two large shafts in the Morton Salt Co.'s Fairport Harbour mine at Painesville, were dug through a sandstone formation producing gas at 700 lb. p.s.i. and flowing a very salty brine. Several gel treatments corrected this condition and left the shafts completely dry and free of gas.

**Russian Metal Industries—I**

# NON-FERROUS METALS IN THE U.S.S.R.

**I**N the field of non-ferrous metals, the Soviet Union is now one of the leading world producers, second only to the U.S. in copper production, second to Canada in nickel and approaching world supremacy in aluminium.

Up to the Second World War, the Soviet Union had drawn on Western knowledge for development. Such sources had included pre-revolution foreign "Capitalist" concessions, such as the copper electrolytic refinery at Kyshtym and the copper production plant at Karsakpay; written works by Western metallurgists and scientists; and the help of 175 American engineers who served in the Soviet Union till 1937 as consultants for the Soviet non-ferrous mining and metallurgical industries. Under their guidance much basic reconstruction and development was carried out under the First and Second Five-Year Plans and this technical aid was extended in respect of all metals except tin.

Since the Second World War, the Russians have gained considerable knowledge from the Germans and Japanese, while current developments in Western countries are closely studied, technical Press articles being translated and published in Soviet "information journals".

Under the auspices of the All-Union Science Research Institute for Non-Ferrous Metals, separate scientific research institutes have been established for various groups of metals and several specialized departments and laboratories have been opened by the Soviet Science Academy and by most universities and technical institutions. Laboratories associated with production plants also make a material contribution to research. The number of trained personnel is now adequate for all Soviet needs and non-ferrous mining and metallurgy have not only reached the theoretical level of Western techniques but are benefiting from the fruits of Soviet research.

## Seven-Year Programme

In practice, however, the Soviet non-ferrous industry suffers from high production costs, low productivity and excess loss of metals during the whole recovery process and still lags behind Western standards. During the present (1959-65) Seven-Year Plan, however, efforts are being made to eliminate these defects and of the planned increase in production about half is expected to come from improved productivity of labour and in technological processes and the rest from new investment.

During the 1959-65 period, the domestic consumption of non-ferrous metals is expected to increase and it is estimated that in 1965 nearly twice as much copper and copper-zinc alloys will be needed as in 1958. With the capacity of the metallurgical plants substantially increased, there will be an

urgent need for bigger supplies of ore to keep them working to capacity.

Whereas in 1957, 192,500,000 cu. m. of non-ferrous metal ores were mined, 92,500,000 cu. m. by opencast methods and 100,000,000 cu. m. underground, the target for 1965 is 400,000,000 cu. m., of which 260,000,000 cu. m. are to be mined by opencast methods and only 140,000,000 cu. m. by underground operations.

It is hoped to meet the demand for increased output by opening up several new mines equipped for large-scale production amounting to 12,000,000 to 16,000,000 cu. m. a year from each opencast mine and 2,500,000 to 5,000,000 cu. m. a year from each underground mine and by technical improvements to increase labour productivity to one-and-a-half times or even double the previous level and reduce production costs by at least 20 per cent.

Since, in general, the richer ores have been exhausted, the capacity of the mines and ore processing plants must be increased faster than that of the smelters to deal with the lower metal content ore and the quantity of ore must be increased to maintain metal output.

To make good the shortage of ore from domestic sources, the Soviet Union imports large quantities of non-ferrous metal ores and concentrates, re-works slag heaps and collects and processes scrap. Imports of ores and concentrates have increased from 1,005,000,000 roubles (£88,000,000) in 1955 to 1,815,000,000 roubles (£159,000,000) in 1957 and 1,614,000,000 roubles (£142,000,000) in 1958. Imports come chiefly from Czechoslovakia, China, Poland and Bulgaria.

The planned annual production from slag dumps is 10,000 tons of lead, 90,000 to 95,000 tons of zinc, 1,000 tons of tin and a considerable amount of copper and rare metals—all at a production cost of not more than 100 roubles (£8 15s.) a ton.

Production of non-ferrous metals from scrap is regarded as important. For instance, about 30 per cent of the total annual production of copper in the Soviet Union is claimed to be from scrap and the Council of Economic Mutual Assistance has a special department dealing with the problems of using scrap metals.

## Progress Towards Self-Sufficiency

Progress toward self-sufficiency is indicated in the table below showing estimated non-ferrous metal production.

Production did not begin to catch up with domestic consumption until about the beginning of World War II. About this time, the country became self-sufficient in zinc,

Estimated Non-Ferrous Metals Production  
(tonnes)

		Copper	Zinc	Lead	Nickel	Tin	Aluminium	Magnesium
1937*	Second five-year plan	..	99,000	78,000‡	63,000	6,000	—	37,700
1940	Best pre-war production	..	146,000	85,000	80,000	15,000‡	3,000	N.A.‡
1945	Post-war production	..	120,000	52,000	40,000	17,000	4,500	85,000
1950*	Fourth five-year plan	..	218,000‡	130,000	90,000	38,000	12,000‡	155,000
1955*	Fifth five-year plan	..	348,000	250,000	210,000‡	49,000	21,600	450,000
1958	Present-day production	..	435,000	350,000	260,000	58,000	28,800	600,000
1960†	Sixth five-year plan	..	556,000	450,000	320,000	80,000	35,000	900,000
1965†	Seven-year plan	..	800,000	550,000	390,000	—	1,800,000	—

Production of refined copper amounted to: 1937, 92,000 tonnes; 1958, 405,000 tonnes; 1960 (planned), 520,000 tonnes; and 1965 (planned), 750,000 tonnes. N.A. signifies Not Available. Symbols (‡) mark approximately the beginning of self-sufficiency in each metal. Figures up to and including 1937 are official Soviet figures. From 1940 onwards the figures are estimates with possible errors of plus or minus 10 to 15 per cent. \* End of period. † Planned for end of period.

To what extent the Soviet Union is succeeding in her struggle for self-sufficiency in metals, or indeed is gaining the lead in metal production is a subject of vast interest to the Western world. The short series of articles commencing in this issue are based on two notable contributions to the subject which have appeared in recent months. Of these, one by Jan Kowalewski, which deals with non-ferrous metals under the title "The Soviet Union's Struggle for Self-Sufficiency in Metals" appeared in the December issue of *Optima*, a quarterly review published by the Anglo American Corporation of South Africa. The other, entitled "The Battle for Steel Supremacy—The Soviet Union Leads in Raw Materials" was contributed by Alexander Gakner to the November issue of the American journal *Iron and Steel Engineer*. Lt.-Col. Kowalewski, who now lives in London and writes extensively on Soviet strategic and economic problems, was at one time managing director of Tissa Ltd., a semi-governmental company in the Soviet Union dealing with strategic raw materials. Mr. Gakner is the East European Specialist in the Division of Foreign Activities at the U.S. Bureau of Mines.

aluminium, magnesium and nickel. This progress was interrupted by the war, and, although the output of aluminium, magnesium, nickel and tin continued to increase, there was an appreciable drop in the production of copper, lead and zinc and it was necessary to rely partly on imports to cover requirements. The balance was restored, however, during the 1946-50 period and in 1955/57 large quantities of non-ferrous metals were exported, though some exports were off-set by imports (chiefly from other Soviet bloc or other Communist countries) as follows:

#### Foreign Trade in Non-Ferrous Metals

(in tonnes)

		1955	1956	1957	1958
Copper	Exports	36,700	52,400	60,600	43,000
	Imports	none	none	none	none
Zinc	Exports	35,500	50,900	72,200	66,400
	Imports*	47,300	48,100	32,500	31,400
Lead	Exports	26,200	40,500	54,900	62,200
	Imports†	17,600	26,700	27,700	30,200
Tin	Exports	2,100	3,300	18,300	22,300
	Imports‡	16,900	15,700	22,000	19,400
Aluminium	Exports	41,000	59,900	85,000	114,900
	Imports	7,000	9,700	none	none

\* All from Poland. † Mainly from North Korea, Yugoslavia, Iran, etc.

‡ All from China.

The agreement limiting Soviet exports of tin to the West sets a maximum of 13,500 tons in 1959 and its export/import position *vis-à-vis* China will probably be maintained.

Export and import prices are below domestic prices for industrial metals but are still considerably above the market prices in the West. They do, however, roughly follow the pattern and proportions of Western prices for non-ferrous metals as shown in the following table:

#### Soviet Prices for External Trade

	Roubles per tonne	Sterling equivalent (average)	Western market prices*
Zinc	.. 1,113 to 1,180	£100 11s.	£97 0s.
Lead	.. 1,400 to 1,460	£125 9s.	£71 15s.
Aluminium	.. 1,822 to 2,117	£172 15s.	£180 0s.
Copper	.. 4,000 to 4,140	£375 0s.	£250 0s.
Tin	.. 8,350 to 12,000	£892 11s.	£794 10s.

\* Aluminium price as quoted by *Metal Bulletin*, Oct. 16, 1959. Other prices, London Metal Exchange, Oct. 22, 1959.

Soviet exports of copper, lead, zinc and aluminium were more than doubled in the period 1955/57 and those of tin jumped suddenly in 1957 by 15,000 tons, indicating a marked development of the domestic tin industry, since imports of tin from China increased by only 6,300 tons. A large part of these exports went to countries of the Soviet economic bloc.

The present Seven-Year Plan does not envisage the general export of non-ferrous metals since production will be planned to meet growing domestic demand with due allowance for

the obligations of the Soviet Union in respect of the Soviet economic *bloc* as a whole, whose non-ferrous production is far from being self-sufficient. Exports of non-ferrous metals from the Soviet Union to the West are, therefore, likely to remain limited in quantity and irregular.

To attain self-sufficiency within the Soviet Union, mining and metallurgy have been conducted regardless of cost and some enterprises would be regarded as uneconomic by Western standards. Moreover, Russian mining and metallurgical economic standards are still poor and there is a considerable loss of metals that could be recovered by more efficient methods. Such economic considerations have, however, for the time being been ignored and insistence has been made only on a gradual betterment, though a considerable improvement is sought under the present Seven-Year Plan.

#### Domestic Prices

Because of the exclusive nature of the Soviet industry, domestic prices differ from those ruling in the West as can be seen from the following comparison of prices for industrial metals, using 1955/58 Soviet statistics and with prices shown as indices based on the price of copper which is taken as 1:—

#### Soviet and Western Non-Ferrous Metal Prices Index

Copper — 1

	Soviet Union	Western countries
Zinc ..	.. 0.75	0.32
Aluminium ..	.. 0.9	0.76
Copper ..	.. 1.0	1.0
Lead ..	.. 1.25	0.28
Nickel ..	.. 4.4	2.4
Tin ..	.. 18.0	3.15
Selenium ..	.. 21.0	22.5
Tellurium ..	.. 21.0	6.3
Cadmium ..	.. 34.0	4.25
Cobalt ..	.. 38.0	6.3
Lithium ..	.. 90.0	—
Zirconium ..	.. 230.0	—
Niobium ..	.. 286.0	—
Thallium ..	.. 714.0	24.0
Germanium ..	.. 2,860.0	533.0
Indium ..	.. 7,140.0	65.0 - 80.0

The Soviet price of copper is taken as 4,900 roubles (about £430 sterling).

To allow the costs of mining and recovering metals to be evaluated at various stages, special price lists are maintained for metals in ores, concentrates and as final metal products. For instance, one ton of copper in its final metallic form is valued at 4,900 roubles (£430); a ton of copper contained in a concentrate of more than 25 per cent copper content is valued at 4,260 roubles (£374); a ton of metal in a concentrate containing between 9 and 25 per cent of copper, 3,700 roubles (£325); and a ton of copper contained in ore is valued at 1,950 roubles (£171).

For zinc, a ton of metal is valued at 3,329 roubles (£292); in concentrates at from 1,000 to 1,500 roubles (£88 - £132); and in ore, 250 roubles (£22).

Other domestic prices of metals in final form are aluminium 4,400 roubles (£386); lead 6,125 roubles (£537); nickel 21,560 roubles (£1,891) and tin 88,200 roubles (£7,737).

The price lists showing the value of metals in their various stages of production form a basis for transactions between the mines and their suppliers and buyers, though the lists are said to give advantage to the metallurgical plants as against the mines and ore processing plants. Thus, while the former can be shown as working at a profit, the latter may show a loss.

Because of the high cost of production of non-ferrous metals in the Soviet Union, it is regarded as unlikely that Russia would attempt to dump them on the Western market.

## Machinery and Equipment

### Geophysical Exploration Flies Higher

Geophysical instrumentation is taking increasingly to the air and in so doing is making possible the more speedy and economical prospecting of large areas. The developments in the field of airborne instruments that have continued since the Second World War, have now been launched into the 1960's by the introduction of the airborne gravity gradiometer. This equipment records variations in the vertical gravity gradient due to change in mass of the earth below the instrument. In a description of the gradiometer, *The Northern Miner* points out that this change in mass can be due to heavy mineral masses such as iron ores, manganese and sulphide ores and other relatively heavier ores as well as geologic structures. The essential requirement is that the desired structure or mass weigh more or weigh less than the surrounding geology.

The instrument is an extremely sensitive weight balance system with two masses each less than one gram, suspended on a common linkage system. One mass is located directly above the other so that the vertical axis through the centre of the mass system points to within 1 deg. of the earth's centre of mass at all times. Since the masses are electro-dynamically equal in weight to within one part in 10,000,000, the instrument functions as a true gradiometer, or measures the vertical gradient of the earth's gravitational pull. Movements of one hundred millionths of a centimeter

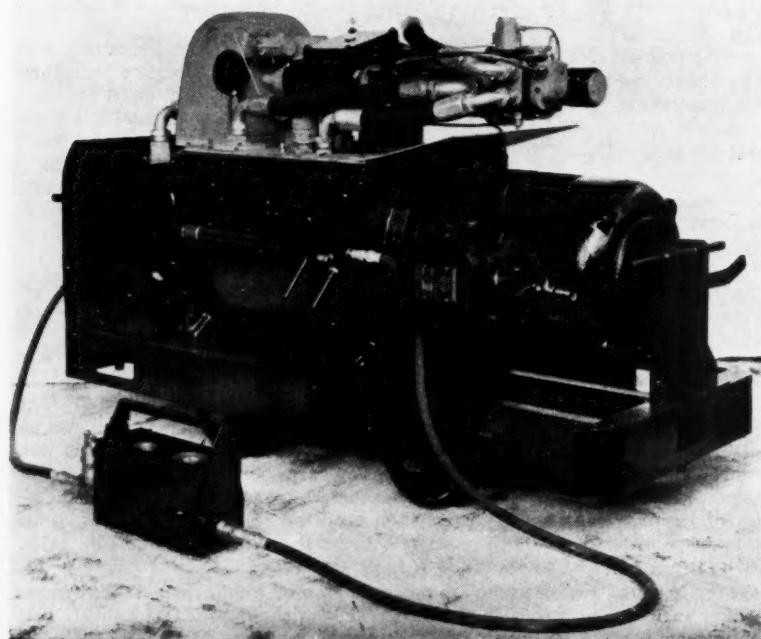
**The Halcotrack drilling machine by The Halifax Tool Co. Ltd.**

can be detected. The instrument will be used for geologic mapping.

To date it has been employed in the mining industry for mineral exploration duties by the French Government in French West Africa. The Swedish and other governments are testing the instrument's applications. It is finding increasing usage in Canadian mining exploration. In some cases a sensitivity 40 per cent greater than ground gravity surveys is claimed. Survey height is usually 1,500 ft. above ground surface.

The new instrument was introduced by Dr. Hans Lundberg.

**The Siskol mobile pump unit type 5/E. Top cover has been removed to reveal the pump**



#### MOBILE PUMP UNIT

The Siskol mobile pump unit Type 5/E is the latest addition to the Siskol range of water infusion equipment. This unit powered by a 25 h.p. flame-proof electric motor incorporates the Tangye Hydraflo pump which is capable of delivering water at 500 g.p.h. at 3,000 p.s.i. or 1,000 g.p.h. at 1,500 p.s.i.

Hydraulic power is used on this pump to reciprocate the plunger and this method replaces the conventional system of gears, crankshafts and connecting rods and results in a great saving in maintenance and spares costs. The pump is suitably protected by a sheet metal cover and is mounted on four roller bearing wheels with adequate braking provision. It is expected that this unit will prove most effective for conventional water infusion and for long hole infusion.

#### MOBILE DRILLING MACHINE

The Halifax Tool Co. Ltd., manufacturers of Halco-Stenick rock drilling machines using the "Down the Hole" principle of drilling, announce the introduction of their Halcotrack drilling machine mounted on crawler tracks.

The tracks carrying the machine are driven by independent and powerful air motors. A 175 c.f.m. compressor will provide an adequate air supply for both drilling and moving but the unit has ample power to tow portable compressors up to and including 600 c.f.m. size. Sprockets are provided, on the air motors, to enable two alternative travelling speeds of 1-1½ m.p.h. and 2-3 m.p.h. At the lower ratio a gradient of 1 in 2½ can be climbed. The tracks can rise and fall independently of the chassis and of one another allowing the machine to travel over rough terrain without difficulty.

The drilling part of the machine is basically the Halco-Stenick Mark III universal machine for putting down 4 in. or 3½ in. dia. holes at any angle, from vertical to horizontal, to 150 ft. by either

dry or wet drilling methods. A rack is provided for the interconnecting tubes.

The main feature of this machine is that it can be moved and operated by one man, when a compressor is attached, or if it is connected by a flexible pipe to a static air supply.

#### ANOTHER WORLD RECORD

What is claimed to be the world's largest mine hoist is reported as being delivered shortly by a Swedish company to the Soviet Union. It is intended for a double-hoist system with a loading capacity of 50 ton/kip, and forms part of a delivery of nine hoisting units, one other being of the same size.

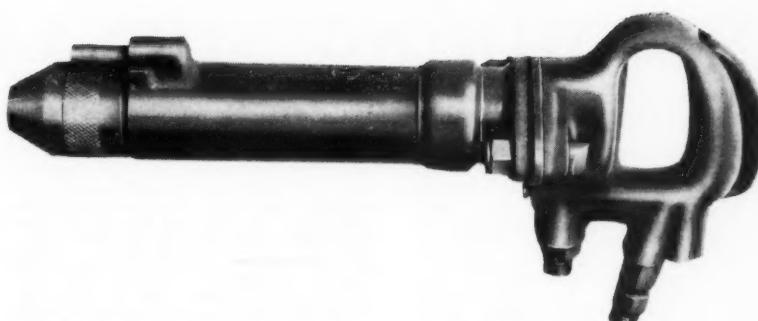
The hoist drum weighs 49 tons and its two skips weigh 40 tons each. For lifting the drum out of the construction hall it was necessary to build new traversing gear. In spite of the heavy capacity of the pulley unit its diameter is only 14 ft. The driving speed is 33 ft./sec. at a depth of 3,000 ft. The motor is of 9,000 h.p. derived from four separate units which are connected to the driving wheels by means of two double-reduction precision gears.

The mechanical equipment, however, is designed for an ultimate depth of 4,300 ft. which will mean an increase in the driving speed to 46 ft./sec. at a simultaneous increase in the motor output to 12,000 h.p. Delivery of the hoists, which are wholly automatic, includes skips, measuring pockets, and underground transportation equipment for conveyance of the ore from the crushing stations.

#### NEW WET PICK

A new wet pick, known as the FL 18W wet type pick has been developed by The Consolidated Pneumatic Tool Co. Ltd., for use where suppression of dust by water spray is required.

In this pick, water is fed to a swirl spray fitting sited near the nose of the pick, resulting in the formation of a dense mist round the pick steel. The high concentration of finely divided



The Consolidated Tool Company's new FL 18W wet pick

water particles so formed enables a very high degree of wetting of the dust raised by the pick steel to be achieved whilst at the same time enabling the rock being worked to be kept thoroughly wet. Air and water channels are independent and of particular note is the fact that the model is water controlled and cannot be operated as a dry machine due to the design of the throttle which requires water at a pressure of 20 lb./sq. in. minimum pressure before the air control becomes effective.

The overall length of the new pick is 19½ in. and its weight is 23½ lb. Nipple size for both air and water inlets is ½ in. BSP. The pick has a single combined throttle control for both air and water, this being combined in a single rubber bonded trigger. All seals and valve seats are obtained by the use of "O" Rings and extensive use is made of Grovelock pins which facilitate dismantling and assembly. A feature of the tool is full cushioning of the piston which considerably improves operator comfort. A screw-on type retainer is employed, which is locked by a rubber ring.

#### NEW ANALYSIS EQUIPMENT

In modern industry, quality control is an integral part of progress and the metallurgical industry is one of the most exacting in this respect. The increasingly high standards demanded necessitate new and more precise techniques of quality measurement and more specialized and accurate devices to arrive at such measurements.

Over the past 30 years the policy of The Mond Nickel Co. has been to devote a large part of its energies and expenditures in the maintenance of a highly organized development and research service. The company's Birmingham laboratory is probably the largest

and best equipped research organization in its field in Europe and the acquisition of new and up-to-date equipment is a high priority.

In June this year, the department took delivery of one of the first models of a new automatic X-ray fluorescence spectrometer, manufactured by Solatron, which carries out non-destructive precise measurements of the constituents of an alloy exceeding 0.1 per cent.

More recently, a solids mass spectrometer, the first commercially produced machine of its kind in the world, has been installed. This equipment, supplied by Metropolitan-Vickers, analyses for all elements in the periodic table down to one part in 100,000,000.

These two instruments together provide a unique combination of sensitive and accurate analysis over a wide range of compositions.

#### TRACTOR SHOVELS FOR SWEDEN

British-made tractor shovels powered by Perkins six-cylinder diesel engines are becoming increasingly popular in Sweden.

Bray Construction Equipment Ltd. have just received an order worth more than £35,000 for ten tractor shovels powered by Perkins P6 diesel industrial engines from their agents, R. A. Dahlgren Ltd., of Lidköping. This follows a consignment of four similar machines, recently despatched to Sweden.

The tractor shovels, which have four-wheel drive, hub reduction axles, double acting hydraulics, power assisted steering and four-wheel brakes, are now in use in quarries and on highway construction work in Sweden. Fitted with Perkins P6 80 b.h.p. diesel engines, torque converters and epicyclic gearboxes, they have a top road speed of 11 m.p.h.



Holman Brothers Ltd., announce the enlargement and re-equipping of its Durion hard chrome deposition plant to meet demands from within the Holman Group and from other companies. This development, which follows hard on the heels of the opening of the new Holman heat treatment department, places the Group in an advanced position in metal treatment and finishing. The Climax Durion plant, as it is called, handles all chrome processing work for the Holman Group and holds under licence the exclusive agency for this process in the West of England. Climax Durion hard chrome is chiefly used to provide a wearing surface of great hardness and durability for all types of metal with the exception of aluminium. Photograph shows a quarry screen of the type widely used for sizing road stone aggregate. The screen has been Durion hard chromed to a thickness of 0.008 in. at the Durion Department of Climax Rock Drill and Engineering Ltd.

## MINING MISCELLANY

Finland's metal production, including ore extraction was much higher in 1959 than 1958, according to the Finlands Metallindustriförening, the national metal organization. In value, an increase of 35 per cent over the year is announced for ores, 29 per cent for raw metals, and 19 per cent for metal products. Details of production for 1959 include, a record figure of 32,600 tonnes for electrolytic copper; 98,000 tonnes for zinc concentrates; 3,400 for lead concentrates; 727 kg.m. gold; 16,300 kg.m. silver; a record figure of 249,000 tonnes for raw steel; and another record of 257,000 tonnes for rolled steel. Production figures for nickel ores, which was resumed in Finland during 1959, are not yet known. Total metal exports for the year totalled 47,100,000,000 Finnmarks, of which 3,100,000,000 Finnmarks came from the sale of ore and concentrates. Some 79 per cent of all metal exports went to Communist countries.

★

A new mine shaft which is expected to yield 90,000,000 tons of good quality coal is being sunk at Zobakpuszta, in the Mecsek coalfields in southern Hungary. Cutting has already begun on a 31-in. seam discovered at a depth of 1,900 ft., but sinking operations are continuing simultaneously and the shaft has now reached a depth of 2,064 ft.

It is reported from Norway that the state-owned Gjersvik cupreous pyrite ore deposit north of Trondheim is to be worked. This orebody was acquired by the Norwegian State in 1918, together with the much larger Joma orebody, but they have both been kept in reserve until now. The Gjersvik deposit contains 1,700,000 tonnes of ore, and will come into production in 1963, with an annual capacity of 200,000 tonnes. This mine will replace the Bjokassen pyrite mine, which will have been worked out by that time.

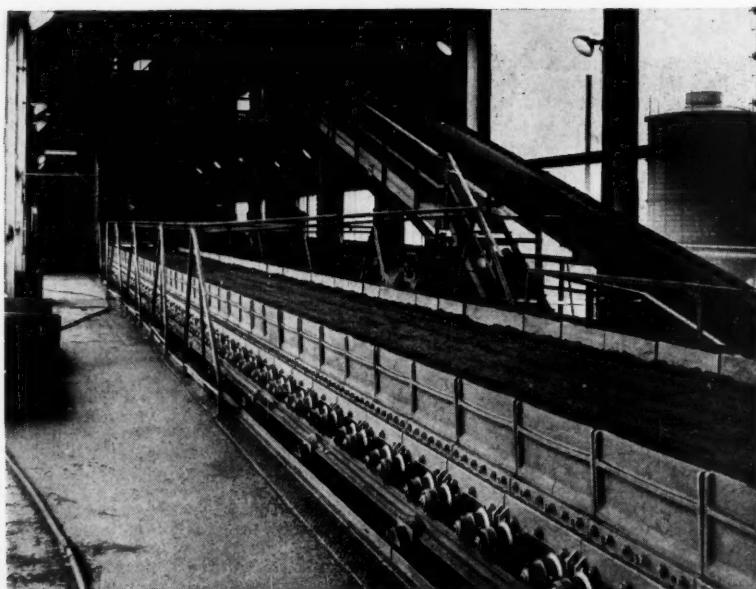
★

Lead and zinc deposits at Mestersvigt in Greenland will be exhausted by the summer of 1961 and the Nordic Mining Co., in its annual report, states that investigations for new economic deposits are being made at a cost of 2,500,000 kroner by Danish and foreign companies. In spite of difficult shipping conditions in 1959, sales of lead, zinc and ores totalled 5,240,000 kroner, and are expected to reach 35,000 tons of metal concentrates in 1960—about double the 1959 figure.

★

The Charbin coal-washing plant in China, with an annual capacity of 1,500,000 tonnes, has been brought into production one year ahead of schedule.

**Head Wrightson Iron and Steel Works Engineering Ltd.**, a subsidiary of Head Wrightson and Co. Ltd., announce the receipt of an order from the Skinningrove Iron Co. Ltd., for the design and construction of a materials handling and iron ore sintering plant at their works at Carlin How, N. Yorks. The plant is designed to produce ultimately 7,000 tons per week of self-fluxing blast furnace sinter from a mixture of imported and home ore fines. The total value of the work involved is approaching £700,000. Incorporated in the plant will be equipment for feeding and controlling automatically the proportions of raw materials, limestone handling equipment, a coke grinding mill, raw materials mixing equipment, a continuous sintering machine with all ancillaries, a forced draught sinter cooler and conveying equipment both for raw materials and for delivering the sinter to the existing blast furnace bunkers. The present order follows the contract recently placed with Head Wrightson for a similar but somewhat larger plant at the Clyde Iron Works of Colvilles Ltd. Illustration shows a sinter plant installation typical of this type of equipment



It is reported from Sofia that Bulgarian electrolytic copper capacity is to be expanded during 1960 by about 7,000 tonnes. An increase of 15.2 per cent is planned for industrial production, the figure for copper being estimated at 13,400 tonnes. By 1965 Bulgaria hopes to have one of the highest outputs of non-ferrous metals in the world, reckoned in proportion to her population, producing 7.5 kg. of zinc and 13.5 kg. of lead per head.

★

A map of mineral deposits situated in the eastern part of Soviet Central Asia has been drawn up by the Institute for Geology and Mineral Research at Tashkent. The map covers many extremely rich mineral-bearing areas, including those around Uzbekistan, Kirgizia, Tajikistan, Turkmenistan and southern Kazakhstan.

★

Finsider, the Italian state organization for ferrous metals production, has announced a development project under which Italy's capacity for these metals would be raised to 7,200,000 tonnes of raw steel and 5,400,000 tonnes of pig iron per year by 1965. Present capacities are only about 4,000,000 tonnes and 1,800,000 tonnes respectively. Investments of 443,000,000,000 lire are planned for introducing new processes, and a new steel plant, while uneconomic existing plants are to be closed.

★

New brown coal deposits are reported to have been discovered near Banja Luka, in the Yugoslav area of Bosnia-Herzegovina. Early exploitation is planned, for an eventual annual output of 100,000 tonnes.

★

A team of Polish experts in coal utilization are visiting Britain to see gas works, coke ovens and research laboratories during their fortnight's tour. Mr. H. E. Collins of the N.C.B., who led a British technical delegation to Poland in 1958, met them on arrival.

★

The West German firm of Kloeckner Industrie Anlagen has signed a contract in Santiago for supplying equipment and machinery to the Las Ventanas copper foundry. In addition to supplying machinery, the West German firm is to give 10,500,000 marks to finance expenditure on the site, taking Chilean debentures in payment. Annual output at the new plant is expected to exceed 25,000 tonnes of blister copper, with possibility for further expansion.

★

Twenty-seven thousand tonnes of salt and 120,000 cu. m. of brine are produced annually by the Saline Hallein concern in Salzburg, Austria. Deposits of 3,000,000 tonnes of copper ore, with at least 60,000 tonnes copper content, an estimated reserve for 20 years, are reported in the Mühlbach and Hochköng region, where the Mittelburger Kupferbergwerk now produce 10,500 tonnes of concentrate annually by flotation from some 165,000 tonnes of ore.

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Mr. E. R. Genis, Guatemalan Minister of Commerce, has announced that uranium deposits reaching as far as the Mexican border, have been found in West Guatemala.

★

Norwegian metal and ore production figures showed slight decrease in coal, iron, copper and sulphur during 1959, while ilmenite, zinc, lead, molybdenite and niobium concentrates, graphite and copper metal, zinc, nickel and magnesium were all a little higher. Aluminium increased from 126,281 tonnes in 1958 to 144,851 tonnes in 1959; pig iron from 259,519 to 335,642 tonnes; steel from 371,428 to 415,519 tonnes; ferro-chrome from 15,935 to 40,562 tonnes; ferro-manganese from 46,801 to 58,176 tonnes and ferro-silicon-manganese from 58,875 to 60,082 tonnes.

It is reported from Belgrade that Yugoslavia plans the production of 1,400,000 tonnes of raw steel in 1960, compared with 1,300,000 in 1959. About half this year's output will be from the Zenica steelworks, with further production coming from Jesenico and Sisak. A new plant is planned for Niksic, in Montenegro.

★

It is reported by the Moroccan weekly *Economic Life*, that production of phosphate, in which Morocco claims to have been the second largest world producer since 1938, was 7,356,000 in 1959, an increase of 13 per cent on the 1958 figure. Output of cobalt was increased by about 30 per cent, to 12,000 tons, while manganese output, for which no figures were given, is said to have gone up by 15 per cent.

Japanese steel concerns are interested in New Zealand's iron sand deposits, 100,000,000 tons of which are situated in the coastal district of New Plymouth. It is stated that these sands could be used directly for steel manufacture without primary processing. Tadao Ichikawa, managing director of the steel firm Niisho Seiko Kaisha has urged the New Zealand Government to lift the export ban on the material and allow exports at a reasonable price.

★

The Greek Government has reported in Athens that French interest has been shown in refining chrome ores and in production of aluminium in Greece. The Greek Bureau of Industrial Development is actively seeking to interest foreign concerns in their mining production.

## Coming Events

The Seventh Commonwealth Mining and Metallurgical Congress will be held in the Union of South Africa, Northern and Southern Rhodesia April 10 to May 21, 1961, the year marking the 75th anniversary of the founding of Johannesburg and the proclamation of the Witwatersrand gold field.

★

The first Effluent and Water Treatment Exhibition is to be held at the Seymour Hall, London, W.1. on October 18-21, 1960. This exhibition is being organized by Thunderbird Enterprises.

★

The Second International Congress and Exhibition for Instrumentation and Automation, INTERKAMA, is to be held in Düsseldorf from October 19-26 1960. Programme and details are now available from Nordwestdeutsche Ausstellungs-Gesellschaft m.b.H. in Düsseldorf.

★

Edgar Allen & Co., announce the appointment of Mr. W. H. Everard as deputy general manager of the Foundry Division, with Mr. J. M. T. Levesley as his assistant.

★

The Fourth International Light Metals Convention, Leoben, Styria (Austria) from June 21-24, 1961.

★

Murex Welding Processes Ltd., are holding an extensive welding exhibition at the works of Specialloid Ltd., Leeds, April 5-9, 1960. The exhibition will be open April 5-8, from 10 a.m.-12.30 p.m. and 2.30 p.m. to 6.30 p.m. (morning only on April 9). Admission free.

★

The Fourth International Congress on Coal Preparation is to be held in Harrogate from May 28 to June 1, 1962. The organization of this congress is being undertaken jointly by the National Coal Board and the Coal Preparation Plant Association.

★

The annual meeting of the American Lead Industries Association will be held in St. Louis on April 6-7, 1960.

## Company News

Powell Duffryn Technical Services Ltd. have seconded their chief coal mining engineer, Mr. J. T. B. Welbourn to serve as the technical member on the Commission of Enquiry, set up by the Nigerian Government to enquire into the problems of the Nigerian coal industry.

★

Firth Cleveland Pumps Ltd., a member of the Firth Cleveland Group, have moved to a new factory at Earl Shilton, Leicester (Telephone: Earl Shilton 2071).

★

Rocol, Ltd., announce that they are to be the only manufacturers of specialized lubricants for industry in the British Exhibition, to be held in New York June 10-26, 1960.

★

Two companies in the Metal Industries Group announce contracts from Northern Rhodesia and India. Lancashire Dynamo, through its Central African company, has received an order for six 1,500 h.p. 11 kV, water-cooled synchronous motors for driving main drainage pumps at the Bancroft Mine in N. Rhodesia, the first motors of this voltage to be used on any of the mines of the Anglo American Corporation Group on the Copperbelt. J. G. Statter & Co. have received an order for an 11kV metal-clad 350 MVA rupturing capacity switchboard for the Durgapur steel works in India. This follows a similar order placed earlier this year.

★

Union Carbide International Co. have published a revised 28-page edition of listing the many products and processes available from their company.

★

Associated Electrical Industries' heavy plant division has received an order for germanium rectifiers for a smelter at Bell Bay, Tasmania, owned by the Australian Aluminium Production Commission. The order, worth more than £400,000, is for equipment with an installed capacity of 42 mW. for an extension to the smelter. The plant is to be commissioned in 1961.

Martin, Black and Co. (Wire Ropes) Ltd. have published a 127-page catalogue of breaking strain tables and general wire rope information specially designed for America and areas using the American Standard tables.

★

Mr. M. D. N. Wyatt, chairman of Airwork Ltd., Mr. P. Ll. Hunting, chairman of Hunting-Clan Air Transport Ltd., and Sir Nicholas Cayzer, chairman of the British and Commonwealth Shipping group, announce that it has been decided to merge the Air Transport interests of the two companies.

★

Mr. Miles Burgess, head of the Owner Group Securities of San Francisco is at present visiting the Union of South Africa, following the interest which American investors have shown in South African gold shares.

★

George Kent Ltd. are transferring all interests, assets and production capacity of their Steering-Gear Division to the ownership and management of Cam Gears, Ltd., as from April 2. Mr. Harold Leese, who has been a director of the Kent organization, is chairman of Cam Gears, and three of the Kent directors are on the new board. The enlarged Cam Gears company has purchased a 20 per cent shareholding of Ross Gear and Tool Co., Inc., of Lafayette, U.S. The main instrumentation and meter business of the Kent company will continue to be transacted from their previous factories and representatives.

★

The Gas Council announce that their telephone number has now been changed to Belgravia 4321.

★

Coppee Co. (Great Britain) are to supply a £1,500,000 coal preparation plant to the Hindustan Steel company at Bhojudih, West Bengal. The contract is for a heavy media separation plant and a cyclone washing plant, which is reported to be the first cyclone type of washery to be installed in India.

## Metals and Minerals

# Aluminium Poised for Further Growth

Confidence in aluminium's future was the underlying note of the annual report of Aluminium Ltd. (see page 391). In the U.S., despite a disappointing first quarter, attributed largely to the extra heavy buying last December, aluminium producers remain no less optimistic and still predict that 1960 will bring a 10 per cent increase over 1959 in domestic aluminium consumption.

Indicative of the industry's aggressive forward planning, based on vigorous technological research and sales promotion and backed by the provision of adequate capacity to take care of growth, is the impressive development programme outlined by Mr. Nathaniel V. Davis in his annual statement, which embraces projects in an ever-increasing number of countries and in five continents.

In recent weeks the major U.S. producers have been steadily increasing their rates of production and they, too, are displaying a rapidly-growing interest in the potentialities of foreign markets. Indeed, hardly a week passes without news of further projects.

Alcoa is to start up a sixth potline at its smelter in Point Comfort, Texas, thereby raising primary aluminium production at this plant to 120,000 tons yearly from the present 100,000 ton rate.

Particularly interesting is the report that Alcoa has raised by one-sixth the planned capacity of its huge new smelter being built near Warrick, Indiana. Work on this project was suspended entirely when the 1957-58 recession cut into Alcoa's primary aluminium needs. Now, the smelter is being completed with a yearly capacity of 175,000 tons, instead of the 150,000 tons originally planned. Alcoa's current expansion activities will raise total capacity to 1,025,250 tons from 818,250 tons at present.

Reynolds Metals expects to bring into initial production about April 1 the second of three aluminium producing potlines at its new St. Lawrence reduction plant at Massena (New York). This will add approximately 33,300 tons to the plant's annual capacity, bringing production up to about 67,000 tons or roughly two-thirds of its ultimate capacity of 100,000 tons annually. Reynolds is currently producing at a rate in excess of 80 per cent of its present capacity of 634,000 tons a year.

Kaiser Aluminium has restarted a potline at the Mead reduction works, which is now operating at 86 per cent of its total rated capacity of 609,500 tons annually.

Kaiser has also announced the start of construction on the aluminium plant for Hindustan Aluminium Corporation Ltd., an Indian venture which is jointly sponsored by Kaiser Aluminium and the Birla interests, headed by the Indian industrialist, Mr. G. D. Birla. Located in Uttar Pradesh State, about midway between New Delhi and Calcutta, this plant will cost over \$30,000,000 and will have an annual production capacity of 20,000 tonnes of primary aluminium. Completion is scheduled for 1962.

Chrysler Corporation, which uses more aluminium per car than any other U.S. manufacturer, has become the

car industry's first producer of its own aluminium needs. Chrysler subsidiaries in Canada have taken over control and operation of Alcan's primary aluminium reduction smelter at Beauharnois, Quebec, which has a rated capacity of 38,000 tons of primary ingot a year. Early estimates placed Chrysler's 1960 requirements for finished aluminium products at 35,000 tons for U.S. alone.

A delegation from the Board of Fria, the international company which plans to produce alumina from bauxite deposits in Guinea, has been holding talks with the Guinean Government to study the impact of that country's recent monetary measures. The delegation included officials of the Olin Mathieson group, British Aluminium, Vereinigte Aluminium Aktiengesellschaft and the French Pechiney company.

Mr. N. H. Custers, managing director and chairman of Aluminium Co. of South Africa (Pty.) Ltd., a member of the Aluminium Ltd. group, has arrived in Salisbury, Southern Rhodesia, to investigate the possibility of establishing the first aluminium fabricating facilities in the Federation.

Poland is planning to build one of the biggest aluminium works in Europe. The scheme is linked with the brown coal-based electricity plant in Maliniec, which will supply power for aluminium reduction. The aluminium plant, scheduled to be in operation by 1962, is expected to be four times as big as the existing aluminium plant at Skawina. It will incorporate shops for the processing of aluminium into tubes, bars, and structural sections.

The foundation stone for a \$7,000,000 aluminium plant—the largest in Latin America—has been laid near Buenos Aires. The plant, which is scheduled to start operating within 18 months, will be jointly owned by the Argentine firm Guillermo Decker and Kaiser Aluminium. It will produce ingots and rolled products and will process aluminium for the car and building industries, as well as household articles.

According to a Surinam newspaper, *De West*, a Danish firm is seeking to exploit bauxite in the Dutch Colony. A representative of the Danish concern, which was not named, visited Surinam recently for discussions and negotiations with the Billiton Suriname Maatschappij N.V.

Three leading Japanese aluminium smelters are planning to send a survey group to Australia to study the possibility of importing bauxite from that country.

Russian offers of aluminium to the U.K. are still being sparingly made, according to trade sources. Price indications have not significantly altered in recent weeks, being equivalent to about £183 to £184, with perhaps a slight tendency to soften. Since December U.K. imports of Russian aluminium have been considerably reduced. In that

month they totalled 980 tons and they fell further to 618 tons in January, according to the British Bureau of Non-ferrous Metal Statistics. For the whole of 1959 imports totalled 15,604 tons compared with 11,225 tons in 1958.

## CHROMITE CONSUMPTION RISES

Despite the steel strike, U.S. domestic consumption of chromite during 1959 was approximately 10 per cent higher than in 1958, according to the Bureau of Mines, U.S. Department of the Interior. In producing 324,000 s.tons of chromium ferro-alloys during the year, a total of 781,000 tons (averaging 46.7 per cent Cr<sub>2</sub>O<sub>3</sub>) of chromite ore and concentrate was consumed; in addition, 15,000 tons was added directly to steel. Of the 781,000 tons consumed, 630,000 tons was reported as metallurgical grade ore, 101,000 tons chemical grade, and 50,000 tons refractory grade.

Producers of refractories consumed 371,000 tons (35 per cent) chromite and 8,000 tons was used in furnace repairs. In producing 119,000 tons of chemicals (sodium bichromate equivalent) 162,000 tons (45.4 per cent Cr<sub>2</sub>O<sub>3</sub>) was consumed.

The Federation of Rhodesia and Nyasaland exported 552,000 tons of chrome ore in 1959, compared with 411,000 tons in 1958 and 701,000 tons in 1957. The U.S. with 309,000 tons was again by far the largest buyer, followed by the U.K. (38,000 tons) and Japan (37,000 tons).

Negotiations for the sale of Turkish chrome ore to the U.S. are reported to be taking a very slow course, since America is not prepared to agree to the Turkish price demand of \$29-\$30 per ton f.o.b. for 48 per cent ore. The total value involved is reported to be about \$4,000,000 in payment for U.S. wheat sent under the U.S. aid scheme. Some 3,511 tons of chromite were shipped to the U.S. in February.

## SPAIN OFFERS URANIUM

The Spanish Government has offered to IAEQ and its member countries some 140 tonnes of uranium, to be contained in concentrates or salts. Forty tonnes could be delivered in the current year and 50 tonnes in each of the years 1961 and 1962. Prices per kgm. of uranium are given as \$19.80 for concentrates and \$24.80 for uranium trioxide.

## WORLD COBALT PRODUCTION

Although the 1959 cobalt outputs are not yet known for all the producer countries, those figures that are available clearly indicate that world production reached a new peak last year, reports Cobalt, the quarterly journal published by "Centre d'Information Du Cobalt", Brussels. The total for the Belgian Congo, Northern Rhodesia,

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Germany and Morocco amounts to 14,750 s.tons; to this must be added an estimated output of some 2,900 s.tons for the U.S. and Canada, which brings the production figure to about 17,700 s.tons. This represents a 20 per cent increase over 1958 (14,750) or an 8.5 per cent increase over 1956 (16,300) which, as may be recalled, constituted the previous peak year.

While the production picture was extremely satisfactory last year, further

gains are anticipated for 1960, due to the entrance on the market of a new American producer, the Freeport Nickel Co., and the increases foreseen by other producers.

It will be recalled that Freeport Nickel however, recently announced plans to suspend operation of its \$75,000,000 nickel-cobalt mine and concentrating facilities at Moa Bay, due to the new Cuban mining law and other recent Cuban developments.

During the week a U.S. export price has again been quoted starting at 31½ c. per lb. and being increased to 31¾ c. per lb., whilst in Belgium the price has been raised from about 31.10 c. per lb. to 31.75 c. per lb., New York or Antwerp. Dealer copper in the U.S. is being more freely offered at slight discounts below the 33 c. per lb. level of both producers and customs smelters, although these latter profess to have sold out for April. What happens when the May books are opened should give an indication of the immediate trend in prices.

In Europe the shortage of wirebars seems to be disappearing but melting copper is still scarce and in Italy the government has announced that it is selling a further 400 tons of cathodes and 1,000 tons of wirebars from the stockpile.

## COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

The hesitancy which was reported last week in the copper market has now spread to other metal prices and with the exception of tin, all quotations are lower.

### COPPER PRODUCTION CUTS—HOW SOON?

With the settlement of the dispute at Laurel Hill, the U.S. copper industry will now be in full production by Easter and it is expected that the weight of copper may begin to affect prices by the end of the month. News from Chile is also to the effect that a strike this spring may be avoided in the copper mining industry there, and should this prove to be correct the whole price structure of the metal will undergo an appreciable change. The increasing probability of lower prices has led to

decreased demand in the U.S., Europe and the U.K. and it seems probable that consumers now have sufficient stocks to enable them to wait a little while before having to buy against current requirements.

Against this background for the physical metal, the London Metal Exchange is still suffering from a shortage of stocks which declined a further 323 tons this week to a total of 2,049 tons. It is believed stocks will decline further next week. In face of this, demand for nearby copper is still sufficient to maintain the price structure as a whole, although with the backwardation fluctuating from day to day. A further factor which has helped to maintain the price level is the situation in South Africa with the possibility of it ultimately affecting Rhodesia. However, knowledgeable opinion considers this to be unlikely.

## LONDON METAL AND ORE PRICES, MARCH 31, 1960

### METAL PRICES

Aluminium, 99.5%, £186 per ton

Antimony—  
English (99%) delivered, 10 cwt. and over £190

Antimony, 10 cwt.

Arsenic, £400 per ton

Bismuth (min. 1 ton lots) 16s. lb. nom.

Cadmium 10s. 6d. lb.

Cerium (99%) net, £16 0s. lb. delivered U.K.

Chromium, Cr, 99% 6s. 11d./7s. 4d. lb.

Cobalt, 12s. lb.

Germanium, 99.99%, Ge, kilo lots 2s. 5d. per gram

Gold, 250s. 24d.

Iridium, £23/£25 oz. nom.

Lanthanum (98%/99%) 15s. per gram.

Manganese Metal (96%/98%) £275/£285

Magnesium, 2s. 2d./2s. 3d. lb.

Nickel, 99.5% (home trade) £600 per ton

Osmium, £22/£24 oz. nom.

Osmiridium, nom.

Palladium, Imported, £8 12s. 6d.

Platinum U.K. and Empire Refined £30 5s.

Imported £28/£28

Quicksilver, £70/£71 ex-warehouse

Rhodium, £45/£48 oz.

Ruthenium, £16/£18 oz. nom.

Selenium, 50s. 0d. per lb.

Silver, 791d. f. oz. spot and 781d. f. d.

Tellurium, 21s. 6d. lb. c.i.f.

### ORES AND OXIDES

Antimony Ore (60%) basis

Beryl (min. 10 per cent BeO)

Bismuth

Chrome Ore—

Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1) £15 15s. 0d. per ton c.i.f.

Hard Lump 45% (Ratio 3 : 1) £15 10s. 0d. per ton c.i.f.

Refractory 40% (Ratio 3 : 1) £11 0s. 0d. per ton c.i.f.

Smalls 44% (Ratio 3 : 1) £14 0s. 0d. per ton c.i.f.

Baluchistan 48% (Ratio 3 : 1) £11 15s. 0d. per ton c.i.f.

Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1) Nb<sub>2</sub>O<sub>5</sub> : Ta<sub>2</sub>O<sub>5</sub> 175s. per l. ton unit c.i.f.

Fluor spar—

Acid Grade, Flotated Material £22 13s. 3d. per ton ex. works

Metallurgical (75/80% CaF<sub>2</sub>) 156s. 0d. ex. works

Lithium Ore—

Petalite min. 34% Li<sub>2</sub>O 47s. 6d./52s. 6d. per unit f.o.b. Beira

Lepidolite min. 34% Li<sub>2</sub>O 47s. 6d./52s. 6d. per unit f.o.b. Beira

Amblygonite basis 7% Li<sub>2</sub>O 75s/85s. per ton f.o.b. Beira

Magnesite, ground calcined £28 0s. /£30 0s. d/d

Magnesite Raw (ground) £21 0s. /£23 0s. d/d

Manganese Ore Indian—

Europe (46%-48%) basis 67s. 6d. freight 73d./75d. c.i.f. nom.

Manganese Ore (43%-45%) 69s./71d. c.i.f. nom.

Manganese Ore (38%-40%) 8s. 11d. per lb. (f.o.b.)

Molybdenite (85%) basis 8s. 11d. per lb. (f.o.b.)

Titanium Ore—

Rutile 95/97% TiO<sub>2</sub> (prompt delivery) £28 0s. 0d. per ton c.i.f. Aust'n.

Ilmenite 50/52% TiO<sub>2</sub> £11 0s. 0d. per ton c.i.f. Malayan

Wolfram and Scheelite (65%) 147s./151s. per ton c.i.f.

Vanadium—

Fused oxide 95% V<sub>2</sub>O<sub>5</sub> 8s./8s. 11d. per lb. V<sub>2</sub>O<sub>5</sub> c.i.f.

Zircon Sand (Australian) 65-66% ZrO<sub>2</sub> £16/£16 10s. ton c.i.f.

### BOLIVIA AND THE TIN AGREEMENT

The tin market has been a little more active with the prices showing more movement than has been the case over the past month, and it is believed that the buffer stock manager is operating on a more limited scale. The small backwardation continues with stocks showing a slight increase of 17 tons to 7,917 tons. During the week the Indonesian Government has made it known that it expects to be able to fulfil its export quota under the International Tin Agreement. Bolivia has indicated that under certain circumstances the country might not sign any new agreement. It is felt that this is purely a political manoeuvre and is unlikely to be carried out. In the East the turnover remains at a high level and on Thursday the price was equivalent to £793½ per ton c.i.f. Europe.

### LEAD AND ZINC

The lead market has been fairly active with a tendency for the backwardation to narrow and the quotations to fall back due to less insistent demand for nearby metal. It is believed that some of the cheaper parcels on the Continent have still not found a home, and with the slight change in sentiment these are pressing more heavily on the market. The current position for zinc remains very tight but offerings of forward metal are becoming freer in view of the probability that the overall situation will become easier with the arrival of additional metal resulting from the relaxation in the availability control.

Closing prices are as follows:

	March 24 Buyers Sellers	March 31 Buyers Sellers
COPPER		
Cash ..	£253½	£254
Three months ..	£237½	£238
Settlement ..	£254	£255
Week's turnover	9,700 tons	9,500 tons
LEAD		
Current ½ month	£77½	£77½
Three months ..	£76½	£75½
Settlement ..	£75½	£75½
Week's turnover	12,900 tons	7,975 tons
TIN		
Cash ..	£785½	£786½
Three months ..	£784½	£785½
Settlement ..	£786½	£789½
Week's turnover	740 tons	210 tons
ZINC		
Current ½ month	£92½	£93
Three months ..	£91½	£91½
Settlement ..	£90½	£91
Week's turnover	5,225 tons	4,050 tons

## Ashanti Still Going Well

There are two key phrases in Sir Edward Spears' annual statement to Ashanti shareholders : "I have a very satisfactory report to make to you"; "We must, therefore, pursue a reasonably prudent policy with regard to the distribution of the higher profit from increased output which we plan to obtain."

About the first of these statements there can be no doubt at all. The year to September last produced spanking results, even in comparison to the high standard expected of this rich company. Tonnage throughput was 41,167 higher than the previous year's record, gold production was also a record, and working costs were reduced. All this in a year when the winter at the mine's most important outlet, the Eaton-Turner shaft, was out of commission for a lengthy period.

One feature of the year that deserves special mention is the achievement of the company's consulting metallurgist, Dr. Chad Norris, in raising recovery to 93 per cent, while simultaneously expanding plant capacity to a nominal 35,000 tons per month, a rate which could probably be regularly exceeded if necessary. The main factor in the increased recovery has been the introduction of a cyanide retreatment stage for flotation tailings, which has alone been responsible for the recovery of an additional 1,000 oz. per month. Also worthy of attention is the further reduction in working costs achieved by the management, which is partly attributable to the higher throughput, and partly to improvements in efficiency underground.

Easy, therefore, to see why Sir Edward describes his report as very satisfactory, and the second quotation above might seem out of key with the obviously encouraging prospects. There are several reasons, however, why shareholders should not look for sharply increased dividends in the immediate future.

One is Ashanti's tax situation. Substantial initial allowances have, in recent years, given Ashanti immediate tax savings at the expense of future years. The time is approaching, however, when the company will feel the impact of the expiry of these allowances, and sums are to be provided against this liability in the accounts for the current year and thereafter. Shaft-sinking and capital expenditure in the coming year, too, will take an estimated £545,000 from profits, so that caution is obviously necessary in viewing the prospects for dividend advancement.

Indeed, Ashanti appears to be entering a period of stability in more ways than one. Development footage in the current year will tend to be in areas away from the most highly enriched sections of the mine. This in turn will react on reserve values and, eventually, on the mill grade. This will not mean any actual reduction in yield, but merely a temporary slowing of the upward trend. On the cost front, too, so much has been achieved in recent years that there can remain few areas in which efficiency can be increased to any significant degree, although improved ventilation may have some effect later this year.

Overall, Ashanti's prospects remain far better than the yield on the shares — more than 9 per cent — would suggest. The only possible reason for the market's oddly low valuation of Ashanti is the view taken by

investors of the Ghanaian political situation. Against this can be set two most important facts. First, that relations between the Ghanaian Government and the British mining industry are friendly, frank and healthy; and second, that racial integration is proceeding rapidly, and, more important, peacefully, in Ghana. From the point of view of the safety of British capital invested in West Africa, the outlook is better than in many other countries where the risk is generally thought to be much greater.

### BIBIANI THE FICKLE

Meanwhile, Bibiani, Ashanti's sister mine, continues to give its engineers just, and only just, sufficient encouragement to keep alive their hopes of finding the substantial new tonnages of ore on which the future of the mine depends. At the moment

**The Mining Journal—April 1, 1960**

there are two main areas in which good tonnages may be developed. But often in the past, Bibiani has given promising indications only for the engineers to find that the promise is unfulfilled.

One thing that is certain, however, is that the efforts to keep Bibiani going will be continued as long as can be managed. Bibiani's fickleness works both ways, and she has, on occasions, produced good bodies in the unlikeliest of places.

Important, too, are the general considerations affecting the area in which Bibiani is situated. Bibiani employs some 2,000 men, and is, indeed the only employer of any size in the area. The whole economy of the area depends on this mine, and in view of the excellent relations between the company and the authorities, it is certain that every effort will be made to keep the mine open.

From this point of view, it is regrettable that Bibiani does not yet know where it stands in the light of the recommendations of Dr. Monture. It is the Ghanaian Government's avowed intention to continue to assist low-grade mines which are in difficulties. It would be regrettable if the position at Bibiani were allowed to deteriorate further without a word from the authorities —even if the word is "goodbye".

## LONDON MARKET HIGHLIGHTS

Wednesday's news that a state of emergency had been declared in South Africa burst like a bombshell on a gold-share market that was already reeling from successive blows. Widespread weakness spread throughout every share section as jobbers hurriedly marked down prices by anything up to 15s., and as a further precaution against any panic selling quickly widened dealing margins by up to 7s. 6d.

These precautions largely succeeded in their object, and the plunge in share values bore little relation to the actual volume in selling. Most offerings came from the Continent and London. There was little evidence of any U.S. selling. Nor was there any real selling pressure on behalf of Johannesburg investors; most of the selling in that centre emanated from London or the Continent. Weak though the Cape undoubtedly was, prices there have been above the depressed London levels.

Any detailed review of share movements at this stage would be useless. Prices are nominal, with widening turns, and developments between the time of writing and of going to press may render even these quotations out of date. All sections with South African connection have shared in the fall, including the mines themselves, the finance and investment companies, and De Beers.

So far in 1960, the Kaffir market has lost at least 20 per cent of its end-1959 capitalisation, and yields have therefore risen by some 25 per cent. A few shares may have been overvalued prior to this, but in the face of falls of this magnitude the mining investor is going to have to take a view about the risks presented by the political and racial situation in the Union, even though this may yet be early days to do so. A situation such as this, which arouses such deep and conflicting sympathies is one about which it is terribly difficult to think dispassionately. At the same time, from the strictly mining viewpoint, the eventual outcome of the present situation may be relatively unimportant, as the uninterrupted functioning of the gold mining industry must remain basic to the Union's economy, however the political or social situation may change. Of more concern to the investor must be

the possibility of an enforced temporary suspension of operations, or of actual physical damage caused in civil disturbance.

Certainly there are signs that specialist investors are weighing these considerations —option business is reaching record levels as operators cover themselves against the possibility of a sharp recovery should the tension ease within the next three months. In response to this, option dealers have raised rates by amounts varying from a few pence to 2s. This is a situation in which the London Market's option facilities are of the utmost value. The "undoing" operations of option dealers provide some steady influence to the falling market, though the magnitude of the present slump has largely swamped this effect in the present situation, though it is equally true that the exercising of options may retard the putative recovery three months hence.

Elsewhere in markets this week, there was little change. The general weakness spilled over into the Copper share market, lowering Chartered by 4s. 4½d. to 80s. 7½d. Rhokana fell 3s. 1½d. more to 51s. 3d. and Messina were 5s. down at 106s. 3d.

Tin shares were little affected by the happenings elsewhere : irregular price movements did not exceed 6d. a share. Lead-zincs also held up well, particularly Consolidated Zinc which on the previous day had staged a sudden advance of 4s. to 77s. 6d. when investment buyers had found little stock available.

West African Golds showed only minor losses. They may have been helped to some extent by the confidence in the future of Ghana expressed by Sir Edward Spears at the Ashanti Goldfields Corporation meeting in London.

There is still support for the view that a rise in the U.S. price of gold may not be so very far away. Investment thinking on these lines has resulted in the past in a steady inquiry for the older Kaffir shares. With Africa so much out of favour, it was thus interesting last week to see small improvements in other Commonwealth Golds, such as Lake View (29s.), Western Mining (9s. 4½d.) and Yukon Consolidated (5s. 1½d.)

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## ALUMINIUM SALES UP IN 1959

Free World consumption of aluminium rose to record levels last year, says Mr. N. V. Davis, president of Aluminium Limited, in his review of 1959 operations. There was, he said, a turning point in markets in mid-year.

Consolidated sales of aluminium by the company in 1959 totalled 643,328 tons, compared with 581,195 tons in 1958. Sales and operating revenues were worth some \$448,700,000, about \$26,000,000 higher than in the previous year, allowing a modest rise in consolidated net profit to \$24,090,720, equivalent to 79c. per share.

Due mainly to the economic difficulties of recent years and the changing emphasis in defence expenditure, aluminium consumption in the U.K. declined slowly in the period 1955-58. This trend was however, reversed in 1959, says Mr. Davis, when the

industrial resurgence was accompanied by a 15 per cent increase in aluminium.

Aluminium Limited's sales in areas outside the U.S., the U.K. and Canada increased by some 51 per cent in 1959. The company now accounts for more than half of all imports into the Common Market area, and almost three-quarters of all imports into Japan.

The extent of the reversal in market trends mentioned by Mr. Davis is illustrated by the fact that in the early part of 1959, Alcan was producing at the rate of some 530,000 tons per annum. Now it is operating at almost 680,000 tons per annum, barely 10 per cent below full capacity. Obviously, therefore, next year's contribution by Alcan to Aluminium Limited's profits should be considerably better than the \$15,359,000 achieved last year, which was, in fact, a reduction of over \$4,500,000 on the 1958 figure.

## FINANCIAL NEWS AND RESULTS IN BRIEF

**British Titan Plans New Plant.**—British Titan Products are to establish a \$15,000,000 titanium oxide plant at Tracy, near Sorel, Quebec. The plant, for which plans are almost complete, will have an initial capacity of 23,000 tons of pigment, and will utilize titanium slag produced at the neighbouring works of Quebec Iron and Steel Corporation.

**Noranda in 1959.**—The net profit of Noranda Mines in 1959 increased to \$11,433,000 from \$9,417,000 in 1958. The 1959 figure is equivalent to some \$2.55 per share. In his annual report, Mr. John R. Bradfield, the president, said that the company's capital expenditure in 1959 totalled \$632,000, a sharp reduction from the \$4,079,000 spent in 1958. No major capital outlays are expected in 1960.

**New Rand Mines Copper Interest.**—A report from Johannesburg indicates that

Rand Mines may soon open a new copper mine in S. Rhodesia. According to the report, the mine is to be situated on the Shamrock claim, some 60 miles north-east of Karos. As yet, Rand Mines have neither confirmed nor denied the report.

**Capital Repayment from Temoh.**—The directors of Temoh Tin Dredging have decided to recommend a capital repayment of 2s. 6d. per stock unit. An extraordinary meeting to approve the proposal will be convened in the near future.

**Burma Mines Results in 1959.**—The accounts of Burma Mines for the year to December 31, 1959 show a profit of £88,461 before taxation compared with £56,381 in the previous year. A dividend of 1½d. per share is recommended, against 1d. in 1958.

After making provision for taxation and the dividend, reserves and unappropriated profits totalled £148,403 at the year-end.

**Trepca Liquidation.**—Mr. Edward Bostock, liquidator of Trepca Mines, has issued an interim statement on the pending litigation between Trepca and Mr. Pasic. It now appears that Mr. Pasic's appeal against a previous decision will not come on during the present sittings, as was stated last November. Mr. Bostock is hopeful that it may be heard during the Easter sittings which begin in three weeks time and continue until Whitsun.

**Gopeng/Kinta Merger.**—Following the merger with Kinta Tin Mines, the registered office of Gopeng Consolidated has been transferred to 65 London Wall, E.C.2, and Grooved Secretaries have been appointed secretaries to the company. A branch office of the company will be maintained at the old registered office (Station Hill, Redruth).

**Lorado Sells Out.**—Another stage in the Canadian Uranium reshuffle was passed recently when Lorado Uranium Mines sold its production contract to Eldorado Mining and Refining Company, the Canadian Government's purchasing agent. Plans are being made for the disposal of plant at Uranium City, and all contracts for custom smelting at the Lorado mill are being terminated. Closing down operations are to begin immediately.

**Henderson's Witbank Offer — Result.**—Shareholders representing 63.6 per cent of the capital of Witbank Consolidated have accepted the offer by Henderson's Transvaal Estates of three Henderson's shares and £1 cash for every four Witbank shares. The board of Witbank will, therefore, be reconstituted in the near future, and Henderson's will take over the administration of the colliery operated by Witbank. Henderson's final dividend will be announced during the second half of May, and the annual report will be issued in June.

**Anglo-Transvaal Industries Acquisition.**—Anglo-Transvaal Industries has acquired the entire interest of South African Breweries in Consolidated Glass Works. Consolidated Glass Works is now a subsidiary of Anglo-Transvaal Industries.

**Messina Registrars.**—The Messina (Transvaal) Development Company have appointed Philip Hill, Higginson, Erlangers as their registrars from April 1.

**Metallgesellschaft A.G. Results.**—Metallgesellschaft A.G. of Frankfurt-am-Main earned a profit of DM. 21,830,000 in the year to September 30 last, compared with DM. 14,750,000 in 1957-8. A capital increase from DM. 56,000,000 to DM. 140,000,000 is planned, and the proposed dividend of 15 per cent will be paid on the increased capital. Last year's payment was 12 per cent.

**Norddeutsche Affinerie.**—Norddeutsche Affinerie, a West German metal refining company in which the British Metal Corporation now has a 20 per cent interest, is to pay a dividend of 15 per cent for the year to September 30 last, compared with 13 per cent in 1957-8. The net profit for the year was more than DM. 1,000,000 higher at DM. 6,180,000.

**Halkyn District Reduces Loss.**—In the year to December 31 last, Halkyn District United Mines reduced its loss from £15,760 to £4,615. Taking into account taxation adjustments and to a credit arising from a reduction in the rate of royalties, the balance carried forward was increased from £31,614 to £33,258. Meeting, May 3, 1960.



## NCHANGA CONSOLIDATED COPPER MINES LIMITED

(Incorporated in Northern Rhodesia)

### SURVEY DRAUGHTSMAN

There is a vacancy at the Nchanga Copper Mine in NORTHERN RHODESIA for a Survey Draughtsman who should have had a minimum of four years' experience, preferably in mining.

The basic salary is at the rate of £88 19s. 6d. per month. In addition to the basic salary, there is a fluctuating cost-of-living allowance which, at the present time, is about £5 10s. per month.

There is a Cash Bonus Scheme which is related to the selling price of copper and is therefore subject to variation. At the present time the bonus is about 30% of basic salary.

There is also a contributory Pension Scheme and free Life Assurance is provided by the Company.

Leave is at the rate of 41 days per annum which may be accumulated up to three years entitlement and, in addition, there are five days local leave each year.

Accommodation for single men is available at once, and for married men within about nine months; the rent for married accommodation is approximately £5 per month for a house which is basically furnished and equipped with a refrigerator. Medical services are provided by the Company for the employee and for his wife and family at a moderate monthly subscription.

The outward passage for the employee is paid by the Company.

Application forms can be obtained from:

Nchanga Consolidated Copper Mines Limited,  
40 Holborn Viaduct, London, E.C.1.

## ASHANTI GOLDFIELDS CORPORATION

### THIRD SUCCESSIVE YEAR OF RECORD TONNAGE AND PRODUCTION DEVELOPMENT RESULTS AUGUR WELL FOR THE FUTURE MAJ.-GENL. SIR EDWARD SPEARS' SPEECH

The 63rd annual general meeting of Ashanti Goldfields Corporation Limited was held on March 30 at the Chartered Insurance Institute, 20 Aldermanbury, London, E.C.2.

**Major-General Sir Edward L. Spears, Bart., K.B.E., C.B., M.C., F.Inst.D.** (Chairman and Managing Director), presided and, in the course of his speech said:

For the third year in succession new records have been achieved in tonnage milled and gold produced. In the current year, if expectations are fulfilled, results should again show an increase over previous records. Planned gold output is 346,000 ounces. Production in the first six months of the current year indicates that this figure should be reached and may be bettered. Development results continue to be excellent. We have every reason for confidence in the future prospects of the Mine.

The attitude of the Ghana authorities towards the Corporation is co-operative and helpful.

We have an excellent staff, including an increasing number of Ghanaians. Our labour is efficient and contented. Relations with the Mineworkers' Union are good. In fact the low fixed price of gold and the very heavy amounts we pay in taxation and minerals duty are the only unsatisfactory aspects of our affairs.

#### Accounts

Capital Expenditure has again been considerable. We have spent £522,000 on Plant and Equipment. The principal items are £155,000 on the Treatment Plant, nearly £200,000 for Power and £117,000 on Underground equipment including the Timber Shaft Winder. In addition we have spent £62,600 in Shaft sinking.

We have met this expenditure from our own resources. Our Cash balances, Gold in Transit and Money on short-term on September 30, 1959, were £1,020,649—a decline of £188,500 on the figure for 1958. Against this, our holding in British Government Securities has increased by £107,000. Compared to last year, our Net Current Assets are lower by £91,700, but our Fixed Assets have increased by £346,000.

The Profit for the year was £1,542,229, an increase of £227,851. This was after charging £338,354 for Ghana Minerals Duty but before charging Income Tax. This Tax took £581,921, leaving a Net Profit of £960,308.

An Interim Dividend of 1/- a share was paid in September, 1959, and we now recommend the payment of a Final Dividend of the same amount. Both these Dividends will be based on the Increased Nominal Capital and will require £764,742 after deducting Tax at 7/9d. in the £.

It will be noted that we pay £155,533 more in tax and duty than the total distributed in dividends. Taxation takes £920,275, and Dividends £764,742.

Ghana Income Tax is considerably higher than United Kingdom Tax now 7/9d. It would be an encouragement to investment in Ghana if the reverse were the case.

We are providing out of profits £100,000 for Fixed Assets Replacement Reserve, £75,000 for Prospecting Reserve and £7,594 for the cost of the Capitalisation of Reserves. These Appropriations with the Dividends total £947,336, leaving £12,972 from the year's Profit to be carried forward.

#### Production Costs Reduced

Among the many favourable aspects of the report I have to make to you I should like to draw your attention to one which reflects particular credit on our Consulting Engineer and the Management at all levels. In a world of rising prices these careful planners have managed to reduce the cost of producing an ounce of gold by 5/11d to 112/7d, which represents a saving of £95,000.

Correspondingly, the mining profit per ton milled has increased from 102/5d. in 1958 to 109/- in 1959.

Although this is in part due to a slightly higher grade of ore sent to the Mill it reflects in the main lower unit costs and improved recovery.

This satisfactory trend continues.

As I said, production was an all-time record for the Mine. 406,365 tons milled yielded 321,366 ounces of gold. This is 41,167 tons and 38,836 ounces more than last year's record.

For the first five months of the current year 183,500 tons have been milled for a gold recovery of 150,400 ounces. This compares to 168,000 tons and 127,550 ounces of gold in the corresponding period last year.

#### Ore Reserves

The Ore Reserves were recalculated at September 30, 1959, and are given in the Consulting Engineer's Report at 1,993,105 tons of an average grade of 17.2 dwts. per ton. This compares with 1,586,300 tons averaging 19.0 dwts. per ton in 1958. Tonnage has increased by 406,805 tons but grade has decreased by 1.8 dwts. per ton. The drop in the average grade of the reserves is due in part to small decreases in the grade of individual reefs but more particularly to the increase in the tonnage of medium grade ore at Ayeim Mine, which has increased from 12 per cent. of the total ore reserve tonnage in 1958 to 27 per cent. in 1959.

For the current year it is planned to increase the milled tonnage from 406,000 to 425,000 tons, thus maintaining the progressive expansion that has taken place since 1956.

Commenting on his visit to Ghana in January and February of this year, the Chairman said:

Ghana is frequently and sensationalized in the news, but a habitual visitor like myself sees nothing alarming in the spectacle of an exuberant community, confident in the future and bursting with vitality.

In the main, the attitude of the Ghanaian people, always friendly, is, it seems to me, friendlier than ever.

The report and accounts were adopted.

The Mining Journal—April 1, 1960

## BIBIANI (1927) LIMITED

### RECORD TONNAGE MILLED

The 33rd annual general meeting of Bibiani (1927) Limited was held on March 30 in London.

**Major-General Sir Edward L. Spears, Bart., K.B.E., C.B., M.C., F.Inst.D.** (Chairman and Managing Director) presided and, in the course of his speech, said: Tonnage milled, 404,527, Gold recovered, 86,075 ounces, and Gold sales, £1,083,531, all show increases over last year's record.

Working costs have risen by £27,346, and we received no grant from the Ghana Government, whereas in 1958 we received £18,225.

Owing to the amount we are spending on development, we have no Ghana Income Tax to pay, which in the previous year took £23,000. However, we pay United Kingdom Income Tax on the dividend. Our total liability for tax is £13,085, which is £20,443 less than last year.

We spent £204,360 on Development. We are spending these large amounts in the hope of prolonging the life of the Mine. Development costs provided by monthly allocation took £142,257, and £50,000 was allocated from revenue after a survey of the ore reserves at the end of the financial year.

But for this provision, the profit for the year, £22,842, would be £72,842, which compares to £78,523 in the previous year.

In spite of the heavy expenditure on development, our liquid position continues to be satisfactory. Cash balances and short term securities at £345,896 have fallen by only £22,860. We have again kept Capital Expenditure to a minimum.

The Ores Reserves were reviewed at September 30, 1959, and are given in the Consulting Engineer's Report at 1,993,105 tons of an average grade of 17.2 dwts. per ton. This compares with 1,586,300 tons averaging 19.0 dwts. per ton in 1958. Tonnage has increased by 406,805 tons but grade has decreased by 1.8 dwts. per ton. The drop in the average grade of the reserves is due in part to small decreases in the grade of individual reefs but more particularly to the increase in the tonnage of medium grade ore at Ayeim Mine, which has increased from 12 per cent. of the total ore reserve tonnage in 1958 to 27 per cent. in 1959.

Having reviewed development results, the Chairman continued: There is as yet no certain indication that sufficient new ore will be developed during the next two years to prolong the life of the Mine significantly. Indications are, however, sufficiently favourable to justify an expenditure of £158,000 on development this year. The possibility of developing major orebodies cannot be excluded, but unless these hopes—and I would emphasize that at present they are only hopes—are realized, it is unlikely that the present milling rate of 30,000 tons a month can be maintained beyond October, 1962.

Referring to his visit to the Mine, the Chairman concluded: The lack of certainty concerning the long term future of the Mine is naturally a matter of the deepest concern to the workers, the local authorities and no doubt the Government.

I was able to assure them that it was the policy of the Board to spare no effort to prolong the life of the mine.

The report was adopted and the final dividend or 2.4 pence per share was approved.

## CURRENT DEVELOPMENTS IN THE U.K. COAL MINING INDUSTRY

**R**ECENT reports from the various divisions of the National Coal Board, reveal that the benefits accruing from the technical skill and experience of personnel in the British coal mining industry are adding to the overall efficiency of the industry.

A method of carrying out periodic tests of Bennett Catch Gear which eliminates the levers and linkages normally used for this purpose has been devised in No. 3 Area, East Midlands Division.

Both the manufacturers and the engineers in No. 3 Area felt that some form of torsion mounting should be used for Bennett Catches to give a "kick" return on the catch. The purpose of this is to eliminate the sticking of catches due to seizing, and also their slow operation due to their inertia, but testing of catches with the new mountings became difficult because of the considerable force needed to lift them against the torsion arrangements.

This difficulty has been overcome by the new arrangement, as illustrated in the accompanying drawing. The essential feature of the device is the modification of the top end of the testing linkage to accommodate a hydraulic jack. This jack is used for test purposes only and is removed immediately afterwards.

The drawing shows the catches in the "raised" position: they are connected through the linkage which joins all the catches together in one vertical row. When the catches are lowered the top end of the linkage rests on packs in such a position as to allow free and adequate movement of the catches in the event of a cage overwind.

For purposes of testing, the jack is placed in position and the catches are raised hydraulically. A pressure gauge attached to the jack enables readings to be taken of the force required to lift and lower the catches; the readings then enable comparisons to be made of the condition of the catches at each test period. These comparisons will indicate any deterioration in the torsion bushings, and any seizing of the catches, bushes or other equipment in the system.

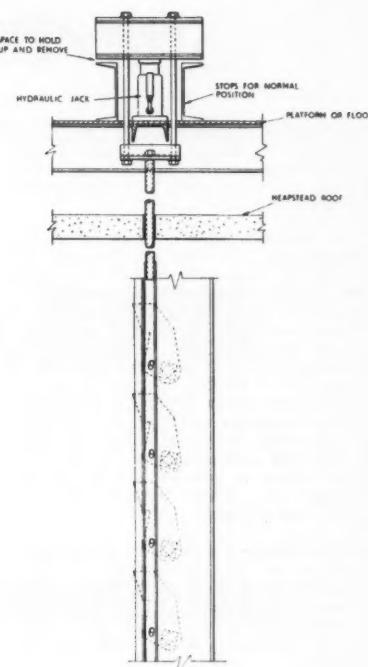
In the event of an overwind, or for any other purpose, the catches can be held indefinitely in the "raised" position by placing packing wedges between the crosshead and stops.

### Recording Load on Conveyors

A bracket which, when used in conjunction with a Servis recorder, will provide a continuous record of the work done by a belt conveyor over a specified period, has been designed in the East Midlands Division.

The bracket is designed to suspend a strip of conveyor belting material above the conveyor. This strip of material is allowed to drag on the conveyor, setting up a vibration in the device which varies with the load on the conveyor. These variations are indicated on the chart of the Servis recorder.

The testing device for the Bennett catch gear. The device eliminates the levers and linkages normally used for this purpose



The bracket consists of an upright member of mild steel angle bar to which is bolted a footplate that can be bolted to the conveyor structure. Provision of a series of footplates enables the bracket to be used on a variety of conveyor structures by employing the appropriate plate. At the top of the upright member a piece of  $1\frac{1}{2}$  in. outside diameter seamless conduit is welded horizontally to such a position that the centre line of the conduit passes across the conveyor at right angles to the line of travel.

A mild steel rod passes through this conduit. At one end of this rod is suspended the strip of belting material; at the other end a mild steel face plate is welded in such a way that the rod is axial to the plate. Two collars at either end of the conduit hold the rod in position and permit movement of the rod relative to the conduit when lining up the device. The strip of belting material should drag a maximum of three inches on the empty belt.

When a Servis recorder is fitted to the bracket three different lines appear on the recorder chart after a normal running cycle. A straight thin line indicates that the conveyor is standing; a thick line indicates that the conveyor is carrying material, the thickness of the line being a rough guide to the amount of material being carried; and a thin wavy line shows that the conveyor is running light.

### Distance Piece for Pneumatic Controller

An adjustable distance piece which facilitates the testing of Worsley Messnes pneumatic controllers has been designed in the East Midlands Division.

When testing winding engine control gear of this type it is necessary to arrange for the overwind trip of the controller to be actuated at an earlier point than when the engine is running normally. The placing of a distance piece on the appropriate thread of the control-

ler has the effect of tripping the braking mechanism at an earlier point in the wind than when the distance piece is not present.

The device is simply a hinged steel collar,  $1\frac{1}{2}$  in. thick, with an inside diameter of  $1\frac{1}{2}$  inches and an outside diameter of three inches. A securing pin is provided to fix it in position.

The point in the wind at which the controller begins to brake the engine depends upon the thickness of the distance piece and by providing three screwed pins on one face of the collar the device has in effect made this thickness adjustable. The collar is tapped to receive these studs, and locking studs are provided to fix the pins firmly in position when they have been adjusted to give an overwind trip at the desired point in the wind.

### Timber Extraction from Chance Cone

A simple means of eliminating timber from the coal flow through a coal preparation plant has proved very successful in use at Nantgarw. The idea involves the cutting of an opening,  $9\frac{1}{2}$  in. in width, in the side of the Chance cone at the washery. A short water chute is attached to the outer side of the opening, so arranged that the bottom of the chute is two inches below the normal water level of the cone. The chute discharges on to a specially fabricated dewatering screen fitted with a vibrating mechanism.

When the cone is in operation water flows out of the opening on to the screen, carrying any timber with it. The action of the screen conveys the timber over a  $\frac{1}{2}$  in. wire mesh and discharges it into a chute while the water with some sand, is carried from the screen outlet, through a pipe, to the sanding screen hopper.

Incorporation of this device in the washery circuit prevents any trouble from timber at the roll crusher in the clean coal circuit.

## Publications Received

**Tin and its Alloys**, edited by E. S. Hedges, published by Edward Arnold (Publishers) Ltd., London, pp. 432, with 187 illustrations including folding plates. Price £6 6s.

Dr. Hedges, who is Director of the International Tin Research Council, and of the Tin Research Institute, has been able to obtain the collaboration in the production of this volume of a group of authors who are outstanding specialists on tin and its alloys, including J. W. Cuthbertson and E. C. Ellwood, both of whom hold Chairs in Metallurgy at British Universities. While the book contains an extensive bibliography and lists of references, the authors' aim has been to give the information, rather than to show where it can be found, and to maintain a useful balance between theory and practice.

**Aufbereitungs - Technik (Processing)**, edited by R. Schirmer and F. Zeh, published by Verlag für Aufbereitung G.m.b.H., Weisbaden, W. Germany yearly subscription for 12 issues, outside Germany DM. 60.00 postage extra.

The aim of this new periodical on the processing of solid raw materials in the mining, metallurgical and chemical industries will be focused on the practice of processing, without, however, neglecting the findings of scientific research. Reports on congresses and expositions

with information on standardization and development of machines will be given, and the periodical also offers a general review of technical journals, abstracts, a technical review, reports on sessions, patents and notices of books.

**Annual Report of the International Tin Research Council**, pp. 36, available in the U.K. from the Tin Research Institute, Greenford, Middx.

The Annual Report of the International Tin Research Council gives an account of the activities of the Tin Research Institute and of its eight branches in other countries. Over 2,000 requests for technical help were received during the year, and several new lines of investigation in metallurgy, tinplate, electrodeposition and in organotin chemistry are noted.

★

*The Proceedings of the Symposium on Shaft Sinking and Tunnelling* held in July 1959 have now been published by the Institution of Mining Engineers, Price £3 3s.

★

*The New West*. This booklet, available on request from the Dollar Exports Council in London, has been prepared to draw the attention of British manufacturers to opportunities for trade with the eleven Western States of America.

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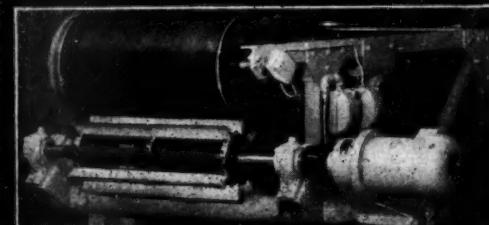
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Left: CABLE BELT rope driven conveyor. Length 7,500 feet, Lift 220 feet, 42 in. Belt at 350 ft./min. handling 600 tons/hour of R.O.M. Coal.

Photograph by permission of the National Coal Board, East Midlands Division, Bestwood Colliery.

Right: CABLE BELT rope driven conveyor. Length 7,260 feet, Lift 300 feet, 24 in. Belt at 200 feet/minute, handling 200 tons/hour of chalk.

Photograph by permission of the Associated Portland Cement Manufacturing Company Limited.

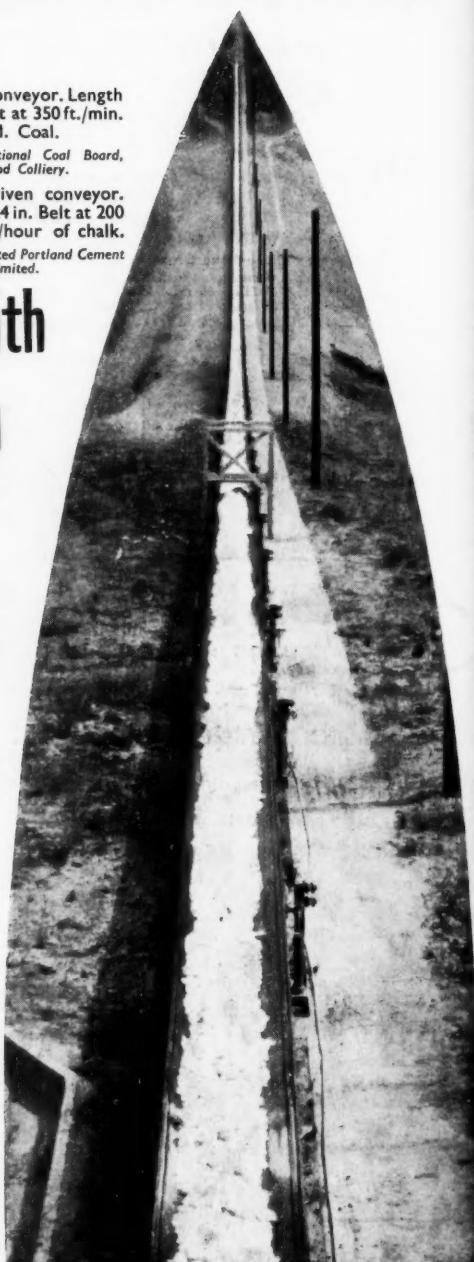
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